PDP11

T17-4K SYSTEM EXERCISER

MD-11-DZQKB-G

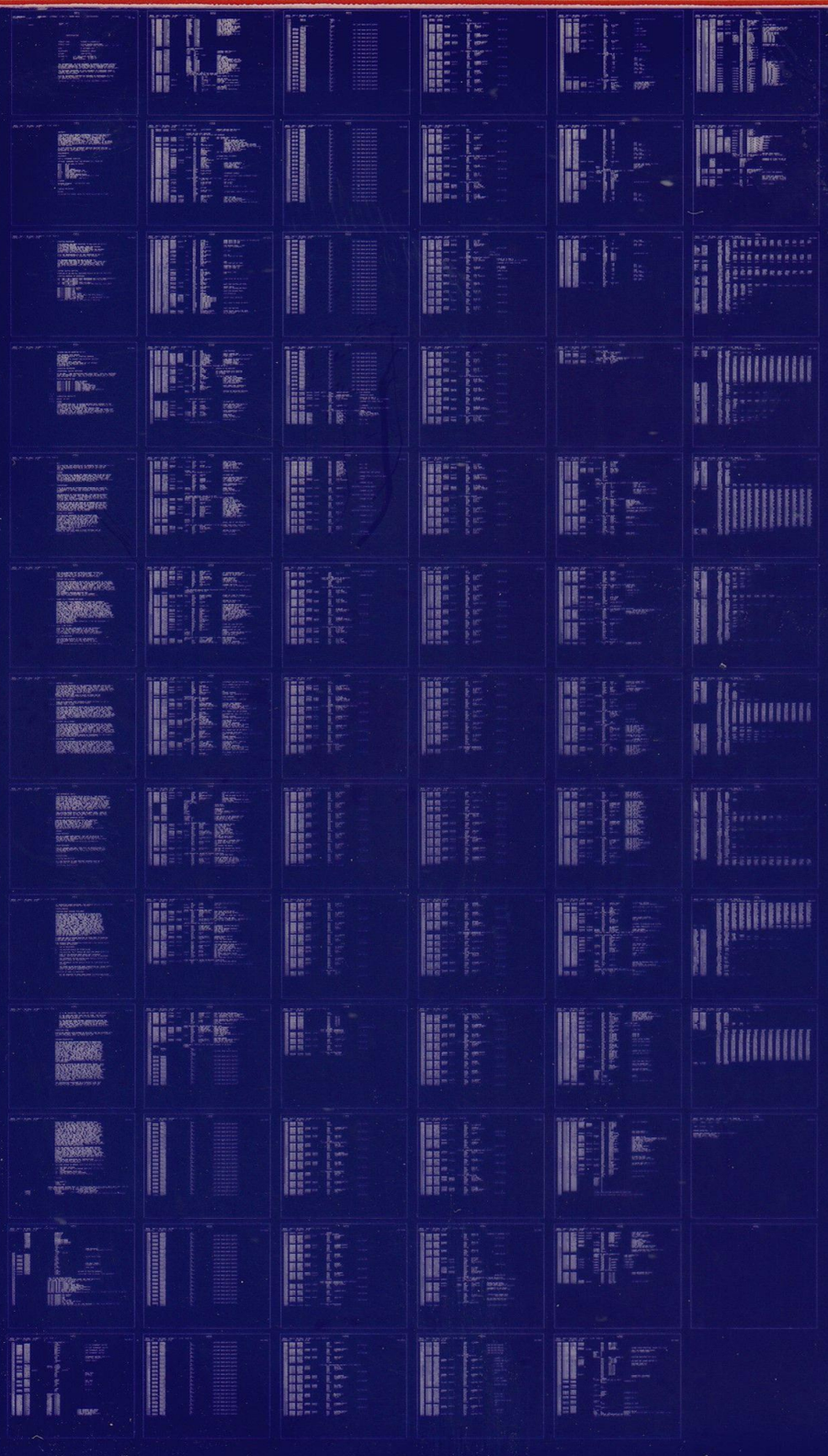
EP-DZQKB-G-DL-G

FICHE 1 OF 1

DEC 1977

digital

MADE IN USA



```
1
2
      000000        .NLIST  SEQ
                    .REPT 0
```

IDENTIFICATION
****

PRODUCT CODE: MAINDEC-11-DZQKB-G-D

PRODUCT NAME: T17-4K SYSTEM EXERCISER
THIS VERSION TEST DECTAPE UNIT 1 (NOT UNIT 0)

DATE: 01-OCTOBER-1977

MAINTAINER: DIAGNOSTIC GROUP

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1. ABSTRACT

THIS PROGRAM IS A MEMORY EXPANDABLE INTERACTIVE BUS EXERCISER FOR A PAPER TAPE ORIENTED PDP-11. IT PERFORMS A TEST OF INSTRUCTIONS AND CONCURRENT OPERATIONS OF I/O EQUIPMENT SIMULTANEOUSLY. IT MAY ALSO PERFORM THE SAME OPERATION INDEPENDENTLY. THIS PROGRAM IS NOT TO BE CONSIDERED A TOTAL CHECK OF THE SYSTEM. IF AN ERROR IS DETECTED IN AN I/O DEVICE, IT WILL PROBABLY BE NECESSARY TO CORRECT THE MALFUNCTION WITH THE RESPECTIVE DIAGNOSTIC FOR THAT DEVICE.

IN THIS VERSION THE INTERRUPT SERVICE ROUTINE FOR THE DISKS, KW11L, PLUS THE STACK AND THE NPR DATA BUFFERS ARE RELOCATED TO THE CURRENT BANK.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-11 STANDARD COMPUTER

2.1.1 OPTIONAL HARDWARE THAT THE PROGRAM WILL EXERCISE

MM11	UP TO 28KW OF MEMORY
RC11	DISK
RK11	DISK
RP11	DISK
RF11	DISK (256K)
TC11	DECTAPE-TRANSPORT ONE
KE11A	EXTENDED ARITHMETIC UNIT
KW11L	LINE CLOCK
PC11	HIGH SPEED READER/PUNCH
BL11	ASR33 OR ASR35 TELEPRINTER-LC11,VT05
LP11	LINE PRINTER
LS11	LINE PRINTER...SEE 5.2.11

2.2 STORAGE

2.2.1 PROGRAM STORAGE - THE ROUTINE USES 4K OF MEMORY

3. LOADING PROCEDURE

3.1 METHOD

PROCEDURE FOR NORMAL ABSOLUTE TAPES SHOULD BE FOLLOWED.

4. STARTING PROCEDURE

THIS PROGRAM HAS BEEN MODIFIED TO RUN WITH OR WITHOUT
A CONSOLE PROCESSOR.
IF A CONSOLE MACHINE IS USED; THEN THE PROGRAM
LOOKS AT THE HARDWARE SWITCH REGISTER.
IF A CONSOLE-LESS MACHINE IS USED;THEN THE PROGRAM
AUTOMATICALLY LOOKS AT THE CONTENTS OF LOCATION
SOFTSR (176) AS A SWITCH REGISTER.

IT'S THE RESPONSIBILITY OF THE OPERATOR TO SET UP
THIS LOCATION PRIOR TO STARTING THE PROGRAM.

THE PROGRAM REQUIRES TWO BELLS ON THE TTY
TO MAKE ONE TRUE PASS OF THE PROGRAM. THE FIRST BELL
OCCURS AFTER ONE PASS OF THE INSTRUCTION TEST WITH
THE TRACE BIT CLEARED. THE SECOND BELL MARKS THE
END OF AN INSTRUCTION TEST PASS WITH THE TRACE BIT
SET.

4.1 CONTROL SWITCH SETTING

STARTING AT SA 200 ALL SWITCHES SHOULD BE SET AS INDICATED.

4.2 STARTING ADDRESS OR ADDRESSES

(A) 200 = SR = 000777 TEST PROCESSOR ONLY-WITH CORE EXPANSION
(B) 200 = SR = 001777 TEST PROCESSOR ONLY-4K-INHIBIT
     CORE EXPANSION
(C) 200 = SR = 002XXX TEST I/O ONLY
(D) 200 = SR = 000000 -CORE EXPAND AND TEST ALL AVAILABLE
     I/O DEVICES

SW0 = 1 INHIBIT TTY OUTPUT
SW1 = 1 INHIBIT TTY INPUT
SW2 = 1 INHIBIT MSP
SW3 = 1 INHIBIT MSR
SW4 = 1 INHIBIT LINE CLOCK
SW5 = 1 INHIBIT RF11, RK11, RC11 AND RP11 DISK(S)
SW6 = 1 INHIBIT TC11 DECTAPE
SW7 = 1 INHIBIT LINE PRINTER --- IF LINE PRINTER IS USED,
     MUST RESTART AT 502
IF EAE EXIST IT WILL BE AUTOMATICALLY SELECTED

4.3 PROGRAM AND/OR OPERATOR ACTION

LOAD PROGRAM INTO MEMORY.
SET SWITCH REGISTER TO STARTING ADDRESS.
LOAD ADDRESS.
SET SWITCHES TO INHIBIT NON EXISTANT DEVICES
PRESS START.
THE PROGRAM WILL LOOP AND
BELL WILL RING ONCE PER PASS OF THE PROGRAM.
A MINIMUM OF TWO PASSES SHOULD
ALWAYS BE RUN.

5. OPERATING PROCEDURE

5.1 OPERATIONAL SWITCH SETTINGS

5.1.1 AT SA 200 .. THE INSTRUCTION AND LOGIC TEST. WITH ALL SWITCHES DOWN THE PROGRAM WILL TEST ALL DEVICES AND PRINT OUT ON ERRORS AND CONTINUE IN TEST. (BELL WILL RING AT COMPLETION OF A PASS)

5.1.2 SWITCH SETTINGS ARE

SW15 = 1 OR UP ... HALT ON ERROR
SW14 = 1 OR UP ... SCOPE LOOP
SW13 = 1 OR UP ... INHIBIT PRINTOUT
SW12 = 1 OR UP ... INHIBIT TRACE TRAPPING
SW11 = 1 OR UP ... INHIBIT ITERATION LOOP
SW10 = 1 OR UP ... INHIBIT PROCESSOR TEST
SW09 = 1 OR UP ... INHIBIT VARIABLE CORE EXPANSION
SW08 = 1 OR UP ... RESTART ON ERROR

5.1.3

5.2. SUBROUTINE ABSTRACTS

5.2.1 BEGIN SA 200

5.2.2 SCOPE

THIS SUBROUTINE CALL IS PLACED BETWEEN EACH SUBTEST IN THE INSTRUCTION SECTION. IT RECORDS THE STARTING ADDRESS OF EACH SUB-TEST AS IT IS BEING ENTERED.
IF A SCOPE LOOP IS REQUESTED WITH SW14=1;THEN
IT WILL JUMP TO THE START OF THE SUBTEST THAT THE SCOPE LOOP IS REQUESTED FOR. IF SCOPE LOOP IS NOT REQUESTED, THERE WILL BE EITHER A FIXED OR RANDOM NUMBER OF ITERATIONS ON THAT SUB-TEST BEFORE THE NEXT SUBTEST IS ENTERED. SWITCH 11 ON A 1 INHIBITS ITERATION OF SUBTESTS.

5.2.3 HLT

IS A ROUTINE THAT PRINTS-OUT AN ADDRESS THAT TAGS THE FAILING TEST, THE STATUS REGISTER AT THE TIME OF THE FAILURE, AND THE PROCESSOR TEST BEING EXCUTED AT THE TIME OF FAILURE.

5.2.4 TRTRAP

THIS ROUTINE WILL ALLOW THE TRACE BIT TRAP TO BE SET AFTER FIRST LOOP OF THE PROGRAM. UNDER NORMAL TESTING THE TRACE BIT WILL BE SET ON ALTERNATE LOOPS OF THE PROGRAM. WHEN SET IT CAUSES A TRAP AFTER EACH INSTRUCTION. THE FIRST INSTRUCTION EXECUTED UPON TRAPPING IS AN "RTI" WHICH RETURNS TO THE INTERRUPTED SEQUENCE OF INSTRUCTION.

5.2.5 TRAPCATCHER

THIS IS A SERIES OF INSTRUCTIONS STARTING AT LOCATION 0, DESIGNED TO DETECT AND ISOLATE UNEXPECTED TRAPS AND INTERRUPTS TO THE TRAP AND INTERRUPT VECTOR AREA OF MEMORY.

THE PRINCIPLE OF THIS ROUTINE IS: THE VECTOR ENTRANCE ADDRESS POINTS TO THE NEXT SEQUENTIAL WORD WHICH CONTAINS A HALT (00000). (THIS LOCATION IS ALSO THE STATUS FOR THAT VECTOR ENTRANCE, BUT THIS HAS NO EFFECT ON IT ALSO BEING THE NEXT INSTRUCTION).

IF A HALT OCCURS IN THE TRAP OR INTERRUPT VECTOR AREA, REGISTER SIX SHOULD BE EXAMINED TO DETERMINE ITS CONTENTS, THEN USE REGISTER SIX CONTENTS AS AN ADDRESS TO DETERMINE THE LOCATION WHERE THE PROGRAM WAS AT, WHEN THE INTERRUPT OR TRAP OCCURRED. (MEMORY AS SPECIFIED BY R6 CONTAINS THE PC OF THE INSTRUCTION FOLLOWING THE INSTRUCTION WHERE THE TRAP OCCURRED).

5.2.6 TTYIN1 (TTY INPUT)

THIS ROUTINE OPERATES IN THE INTERRUPT MODE AND CHECKS FOR A COUNT PATTERN IN THE READER OF THE TTY, THE ROUTINE WILL ACCEPT AN INFINITE NUMBER OF ZERO BYTES (BLANK TAPE). BUT THE FIRST BYTE THAT IS NOT A ZERO MUST BE A ONE AND ALL SEQUENTIAL BYTES MUST BE ONE GREATER. IF THE ROUTINE DETECTS AN ERROR IN THE COUNT PATTERN, IT CHECKS TO SEE IF IT IS A 207 (BELL). IF SO IT IS IGNORED, IF NOT A COMPARSION ERROR IS FLAGED.
WHEN TESTING THE TTY
READER THE TAPE MUST HAVE A COUNT PATTERN AND BE LOCATED ON THE LEADER PORTION WHEN STARTING TEST.

5.2.7 TYOUT (TTY OUTPUT)

THIS IS A ROUTINE THAT OUTPUTS A COUNT PATTERN IN
THE INTERRUPT MODE TO THE TELEPRINTER. IF A PAPER
TAPE IS PUNCHED IT MAY HAVE 207'S (BELLS) IN IT.
PUNCHED WHEN THE BELL FOR PASS COMPLETE RINGS.

5.2.8 RFSTART (RF-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK.
THE DATA THAT IS WRITTEN ON THE DISK IS PART OF IESI PROGRAM
CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN
IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL
DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT
THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO
"DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED
INTO CORE).
THE INTERRUPT SERVICE ROUTINE AND
DATA BUFFER IS TRANSFERRED TO THE CURRENT
BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN.

5.2.9 FENDZ (TC11 FORWARD END ZONE)

FENDZ IS THE FIRST ADDRESS IN THE DECTAPE INTERRUPT
VECTOR (214). THIS ROUTINE WILL READ, IN REVERSE, BLOCK
NUMBERS UNTIL THE REVERSE END ZONE IS FOUND. AT THIS
POINT THE INTERRUPT VECTOR AND COMMAND REGISTER ARE MODIFIED
TO READ ALL BLOCK NUMBERS IN THE FORWARD DIRECTION. EACH
BLOCK NUMBER READ IS COMPARED WITH THE EXPECTED BLOCK NUM-
BER COUNT AND MISCOMPARISONS REPORTED. WHEN EACH BLOCK IS
FOUND (WITH THE EXCEPTION OF BLOCK 0) A BLOCK (400 WORDS)
OF TEST DATA IS WRITTEN ONTO TAPE. AFTER ALL BLOCK NUMBERS
HAVE BEEN READ THE TAPE IS DRIVEN INTO THE FORWARD END ZONE.
HERE THE DIRECTION IS REVERSED AND ALL BLOCK NUMBERS ARE READ
IN REVERSE. STARTING WITH BLOCK 1100(8) THROUGH BLOCK 1 THE
DATA IS READ FROM TAPE. THE SAME BUFFER IS USED FOR BOTH READ
AND WRITE OPERATIONS.
IF THE DATA-BUFFER IS
DESTROYED DURING A READ OPERATION IT MAY BE NECESSARY TO
RELOAD THE PROGRAM.

5.2.10 LCLK (LINE CLOCK)

THIS TEST OF THE LINE CLOCK IS IN THE INTERRUPT
MODE. IF OPERATING CORRECTLY THE SYSTEM I/O
WILL RUN A FULL SPEED FOR 55 SECONDS THEN ALL
I/O AT LEVEL SIX OR LESS WILL STALL FOR 5 SECONDS.
THIS IS BASED ON 60 CYCLES AS THE LINE FREQUENCY.

5.2.11 LP1 (LINE PRINTER)

THIS ROUTINE OUTPUTS TO THE LINE PRINTER IN
THE FLAG MODE WHILE FILLING THE BUFFER IN
THE INTERRUPT MODE WHILE THE BUFFER IS BEING
PRINTED.
FOR 132 COLUMN PRINTER CHANGE LOCATION LP80 FROM 117 TO 203.

5.2.12 HSRIN1 (PC11 INPUT)

THIS ROUTINE OPERATES IN THE INTERRUPT MODE AND CHECKS FOR A COUNT PATTERN IN THE PC11 READER. THE ROUTINE WILL ACCEPT AN INFINITE NUMBER OF ZERO BYTES (BLANK TAPE). BUT THE FIRST BYTE THAT IS NOT A ZERO MUST BE A ONE AND ALL SEQUENTIAL BYTES MUST BE ONE GREATER. IF THE ROUTINE DETECTS AN ERROR IN THE COUNT PATTERN, A DATA ERROR IS FLAGED.
WHEN TESTING THE HSR
READER THE TAPE MUST HAVE A COUNT PATTERN AND BE
LOCATED ON THE LEADER PORTION WHEN STARTING TEST.

5.2.13 HPOUT (PC11 OUTPUT)

THIS IS A ROUTINE THAT OUTPUTS A COUNT PATTERN IN THE IN-
TERRUPT MODE TO THE HIGH SPEED PUNCH.

5.2.14 RKSTART (RK-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERFIY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER ARE TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN.

5.2.15 RCSTART (RC-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE).THE INTERRUPT
SERVICE ROUTINE AND DATA BUFFER IS TRANFERRED TO THE CURRENT
BANK THAT INSTRUCTIONS ARE BEING EXECTUTED IN.

5.2.16 RPSTART (RP-11 DISK)

THIS ROUTINE PERFORMS A WRITE AND A WRITE CHECK OF THE DISK. THE DATA THAT IS WRITTEN ON THE DISK IS PART OF TEST PROGRAM CODE THAT IS NEVER MODIFIED. THIS SEGMENT OF CORE IS WRITTEN IN CONTIGUOUS BLOCK THRU THE DISK MEMORY. AFTER THE TOTAL DISK(S) HAS BEEN WRITTEN, A WRITE CHECK IS USED TO VERIFY THAT THE DATA HAS BEEN WRITTEN CORRECTLY ON THE DISK. NOTE THAT NO "DATI" ARE USED IN EXERCISING THE DISK (DATA IS NOT TRANSFERRED INTO CORE). THE INTERRUPT SERVICE ROUTINE AND DATA BUFFER IS TRANSFERRED TO THE CURRENT BANK THAT INSTRUCTIONS ARE BEING EXECUTED IN. (FOR THE RP03 THE ISR MUST BE MOTIFIED TO TEST THE FULL SURFACE)

5.2.17 CORE EXPANSION (DET1)

THIS ROUTINE IS CONTROLLED BY SWITCH 9. THE PROCESSOR MAINLINE CODE WILL BE EITHER 4KW OR EXPANDS TO THE MAXIMUM CORE THAT IS AVAILABLE. THE ROUTINE DETERMINES THE MAXIMUM CORE SIZE BY DOING A "DATO" TO A LOCATION IN EACH BANK. IF THE BANK DOES NOT EXIST, A TIME OUT WILL OCCUR. WHEN CORE SIZE IS DETERMINED AN IMAGE OF BANK 0 IS TRANSFERRED TO EACH EXISTING BANK. THEN THE CODE IN EACH BANK IS MODIFIED SO THAT, WHEN THE LAST SUB TEST IN A MEMORY BANK IS EXECUTED THERE IS A JUMP INSERTED TO THE FIRST SUB TEST OF THE NEXT BANK. WHEN IN THE LAST BANK THE MODIFIED INSTRUCTION WILL TRANSFER YOU TO BANK 0.

THE LISTING SHOWS ONLY THE CODE OF BANK ZERO. WHEN AN ERROR OCCURS THAT IS NOT IN BANK ZERO, IGNORE THE BANK BITS OF THE PRINT OUT AND USE THE LISTING FOR BANK ZERO.

5.3 PROGRAM AND/OR OPERATOR ACTION

5.3.1 LOADING AND STARTING AT 200 WITH ALL SWITCHES DOWN IS WORSE CASE TESTING. IF AN ERROR IS DETECTED HERE, THERE WILL BE A PRINTOUT. WHEN AN ERROR IS DETECTED AND IT IS NECESSARY TO SCOPE ON IT, SET SW15 TO HALT ON ERROR, THEN SW14 TO LOOP ON ERROR, THEN SW13 TO DELETE PRINTOUTS. THEN THE MACHINE MUST BE CONTINUED.

6. ERRORS

6.1 ERROR PRINTOUT

ARE IN A THREE WORD FORMAT, THE 1ST IS PC+2 OF THE DETECED ERROR, THE 2ND. IS THE STATUS REGISTER.
THE 3RD IS THE PROCESSOR TEST AT THE TIME OF THE ERROR (CONTENTS OF RETURN).
REFER TO THE LISTING FOR DETAILED INFORMATION.

6.2 ERROR RECOVERY

FOR TTY READER AND HSR, TAPE MUST BE REPOSITIONED TO LEADER BEFORE RESTARTING TEST. IT YOU DESIRE TO HAVE THE PROGRAM RESTART ON AN ERROR MAKE SWITCH REGISTER BIT8 AN ONE.

7. RESTRICTIONS

7.1 STARTING RESTRICTION

IF LINE PRINTER IS USED RESTART ADDRESS MUST BE 400
FOR HSR AND TTY READER, TAPE MUST BE ON LEADER.

7.2 OPERATIONAL RESTRICTION

IF OPERATION UNDER MONITORS, THE CONSOLE DEVICE,LINE PRINTERS AND THE SYSTEM DEVICE ARE NOT TESTED.

8. MISCELLANEOUS

TRACKING DOWN UNUSUAL FAILURES

FAILURES THAT MAY OCCUR BECAUSE OF A FALSE ENTRY INTO A SUBTEST, OR A FAILURE IN A CONTROL ROUTINE RATHER THAN A SUBTEST. DETECTION OF THESE MAY BE ACCOMPLISHED BY SEVERAL PROCEDURES. THERE IS A LOCATION CALLED "RETURN" THAT RECORDS THE LAST SUCCESSFUL SUBTEST COMPLETED. THERE IS ANOTHER LOCATION CALLED "SCOPEF" THAT SHOWS HOW MANY TIMES THE SUBTEST HAS BEEN EXECUTED. THERE IS ANOTHER LOCATION CALLED "ICOUNT" THAT CONTAINS THE ITERATION COMPARISON VALUE. THE STACK "R6" SHOULD BE EQUAL TO "BUFF" WHEN THE FIRST INSTRUCTION OF THE SUBTEST IS ENTERED. TO REDUCE INSTRUCTION EXECUTION IN CONFUSING SITUATION, THE "SCOPE" LOCATION FOLLOWING THE SUBTEST SHOULD BE CHANGED TO A BRANCH TO THE FIRST INSTRUCTION OF THE SUBTEST (THE FIRST LOCATION FOLLOWING THE PREVIOUS SCOPE LOCATION) AND THE "HLT" LOCATION MAY BE REPLACED WITH A "NOP".

A USER MAY ADD A UNIQUE ROUTINE TO THIS TEST TO EXERCISE A NON DEC OPTION, FOR CHECKING BUS INTERACTION WITH HIS EXISTING DEC OPTIONS.

FOR TROUBLE FREE INTERACTION THERE ARE A FEW GROUND RULES THAT SHOULD BE FOLLOWED.

1. USE NO REGISTERS.

2. THE ROUTINE SHOULD BE STAND ALONE.

3. THE EXISTING "HLT" SHOULD BE USED FOR ERROR DETECTION.

4. CODE IN THE PRIMING AREA SHOLD SET INTERRUPT ENABLE, INITIALIZE DATA AND RAISE A FLAG IF NECESSARY.

5. THE INTERRUPT VECTOR STATUS WORD SHOULD CONTAIN THE PRIORITY LEVEL OF THE DEVICE.

6. THE INTERRUPT VECTOR SHOULD POINT TO YOUR STAND ALONE ROUTINE.

7. THE STAND ALONE ROUTINE WHEN COMPLETING ALL HOUSE KEEPING OPERATION AND DATA COMPARISONS SHOULD THEN EXECUTE A "RTI" TO RETURN TO MAINLINE CODE.

INSERTION OF USER I/O ROUTINES

1. MAY BE INSERTED IN BANK ZERO WHERE I/O ROUTINES EXIST. FOR DEVICES THAT THE USER DOES NOT HAVE, IF CORE EXPANSION

IS TO BE INHIBITED, THE USER MAY OVERLAY THE EXPANSION CODE.

2. IF THE USER HAS MORE THAN 4KW OF CORE, THE ROUTINE MAY BE PLACED IN ANY OF THE EXTRA BANKS AND CORE EXPANSION BE INHIBITED.

3. IN THE PRIMING CODE SEVERAL INSTRUCTIONS BEFORE THE TAG "MAINLINE" THERE IS AN INSTRUCTION JSR %7,@#USER. THE SECOND WORD OF THAT INSTRUCTION IS AN ABSOLUTE ADDRESS THAT THE USER MAY CHANGE TO POINT TO HIS ROUTINE. THE USER SHOULD EXIT HIS PRIMING ROUTINE WITH A RTS %7 INSTRUCTION.

8.1 EXECUTION TIME

EXECUTION VARIES WITH NUMBER OF DEVICES, FOR 4KW SYSTEMS WITH TTY AND HSR ONLY, ABOUT 1 MINUTE WITH THE TRACE BIT CLEARED ABOUT 1.5 MINUTES WITH THE TRACE BIT SET.

9. PROGRAM DESCRIPTION

THE DESIGN OF THIS SYSTEM EXERCISER IS PREDICATED UPON IT BEING PRIMARILY INTENDED FOR A PAPER TAPE SYSTEM WITH FOUR KW OF CORE, AND THAT IT BE EASY TO RUN AND UNDERSTAND. ALSO, THAT IT MAY BE MODIFIED EASILY TO EXERCISE A WIDE MULTITUDE OF PERIPHERALS, INCLUDING THOSE OF THE CUSTOMER'S OWN DESIGN. THE CONCEPT IS TO HAVE ALL DESIRED I/O RUNNING CONCURRENTLY WITH THE PROCESSOR TEST FOR BACKGROUND. THE DECISION WHICH I/O DEVICES TO BE USED IS MADE AT START UP TIME. THE DATA PATTERNS USED IN THE EXERCISER ARE FIXED. FOR MECHANICAL DEVICES, SUCH AS THE TTY READER, THERE IS NO AUTOMATIC RE-SYNCHRONIZATION IF IT'S TAPE BECOMES OUT OF PHASE WITH THE DATA. IT WILL BECOME NECESSARY TO STOP THE EXERCISER AND MANUALLY RESYNCHRONIZE THE TAPE AND RESTART THE EXERCISER.

THERE IS NO MONITOR IN THE CONVENTIONAL SENSE. EACH DEVICE THAT IS TO BE EXERCISED HAS IT'S OWN STAND ALONE ROUTINE THAT OPERATES IN THE INTERRUPT MODE. THESE ROUTINES NEED NO SUPERVISION OR MONITORING AFTER THEY ARE INITIATED. THERE IS A PRIMER AREA THAT CHECKS THE SWITCH REGISTER TO SEE WHAT DEVICES ARE TO BE INITIATED. THE PRIMER AREA SETS THE INTERRUPT ENABLE BIT IN THE DEVICE STATUS REGISTER, INITIALIZES THE DATA PATTERN AND INITIATES AN OPERATION TO RAISE DATA FLAGS ON DEVICES THAT CAN NOT INITIATE THEM THEMSELVES. THEN, THE PRIMER JUMPS TO THE PROCESSOR TEST WHERE THE INDIVIDUAL DEVICES ARE SERVICED AT THE INTERRUPT RATE.

THE INSTRUCTION EXERCISER IS A STRAIGHT LINE TEST OF INSTRUCTIONS. THE SEQUENCE IN WHICH THEY ARE EXECUTED IS THE SAME SEQUENCE IN WHICH THEY ARE

SHOWN IN THE LISTING. EACH AREA OF CODE FROM
"SCOPE TO SCOPE" IS AN INDIVIDUAL SUB-TEST. WITH
SWITCH 11 UP THE SUB-TEST IS EXECUTED ONE TIME
AND THEN THE NEXT SUB-TEST IS EXECUTED, AND SO ON
TILL ALL SUB-TESTS ARE EXECUTED. HOWEVER IF SWITCH
11 IS DOWN THE SUB-TEST WILL BE EXECUTED SOME "N"
NUMBER OF TIMES BEFORE ENTERING THE NEXT SUB-TEST.
IF SWITCH 14 IS UP YOU WILL NEVER LEAVE THE CURRENT
SUB-TEST YOU ARE IN. THIS USE IS INTENDED FOR
TROUBLE SHOOTING A MALFUNCTION IN A SUB-TEST. THE
FIRST GROUP OF SUB-TESTS ARE THE BINARYS AND UNARYS.
THOSE INSTRUCTIONS ARE TESTED IN THE INDEX MODE:
SOURCE ONLY, DESTINATION ONLY, THEN BOTH SOURCE
AND DESTINATION. THE SAME INSTRUCTIONS ARE THEN
TESTED USING THE IMMEDIATE MODE INDIRECT. THESE
MODES ARE TESTED AGAINST OTHER MODES, WHICH MAY USE
A REGISTER OR MEMORY LOCATION. THESE WILL BE SWAPPED
BETWEEN SOURCE AND DESTINATION.

AFTER THE MODES AND INSTRUCTION HAVE BEEN PROVEN
IN THE WORD MODE, THEY ARE THEN TESTED IN THE BYTE
MODE. OTHER TESTING IS ALSO DONE WHERE THE "JSR"
INSTRUCTION IS TESTED IN NESTED COMBINATIONS. ALL
COMBINATIONS OF NUMBERS ARE TESTED USING THE COMPARE,
ROTATE, ADD AND COMPLIMENT INSTRUCTIONS. THERE IS
ALSO A MINIMUM TEST OF POWER FAIL AND AUTO RECOVERY,
WHICH IS NOT ENABLED UNTIL AFTER THE FIRST PASS OF THE
PROGRAM.
THE REASON FOR EXECUTING ALL INSTRUCTIONS
WITH THE TRACE BIT SET IS TO TAKE US INTO SERVICE AT
THE END OF EACH INSTRUCTION.

THE CORE LAYOUT IS BROKEN INTO FIVE DISTINCT PARTS:

(1) THE TRAP CATCHER,
(2) THE SET UP AND I/O PRIMER AREA AND I/O TEST ROU-
     TINES,
(3) THE PROCESSOR TESTS AND
(4) CONTROL AND UTILITY ROUTINES.
(5) CORE DETECTOR AND EXPANSION ROUTINE.

10. LISTING

11. FLOW CHART(S)

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                        .ENDR
                        .ENABLE ABS

                ;PDP11 PRELIMINARY SYSTEM TEST --- TTY-PC11-LP11,RF11,TC11,KW11L,RK11,RC11,RP11 AND KE11
                ;TEST SIMULTANEOUS RUNNING OF I/O, WITH PROCESSOR INSTRUCTION TEST AND WITH
                ;WITH TRACE BIT ENABLED TO BE CONSIDER MAINLINE CODE
000240                  NOP=240                 ;SYSTEM NULL OPERATION
104000                  HLT=EMT         ;TRAP USED FOR ERROR PRINTOUT
104400                  SCOPE=TRAP              ;TRAP USED SCOPE LOOP AND ITERATION OF SUB PROBLEMS
177776                  CC=177776
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                016062          IDSB=ICSR
                016766          BUFF=FIN
                000000          R100=%0
                000001          R101=%1
                000002          RSR=%2
                176000          BKWORDCT=-2000
                176000          BPWORDCT=-2000
                176040          RCWORDCT=-2000+40
                176040          RFWORDCT=-2000+40
                000000          XX=0
                000000          .=0
                000100          .REPT 100
                                .+2                             ;TRAP ENTRANCE
                                HALT                            ;TRAPPED TO PREVIOUS LOCATION
                                .ENDR
   600                          .LIST   SEQ,ME
   601             000014       .=14
   602  000014     000016       .+2
   603  000016     000000       HALT                            ;FALSE TRACE TRAP
   604             000024       .=24
   605  000024     016504       PFAIL
   606  000026     000340       340
   607             000030       .=30
   608  000030     015564       PRINT                           ;FOR HALT TRAPS
   609  000032     000340       340                             ;HIGHEST PRIORITY
   610             000034       .=34
   611  000034     016364       SCOPEC                          ;USER TRAP
   612  000036     000000       0
   613             000046       .=46
   614  000046     015534       LOGICA                  ;RETURN TO MONITOR ADDRESS
   615             000052       .=52
   616  000052     040000       040000                  ;EXECUTION TIME IS MEMORY SIZE DEPENDENT
   617
   618
   619                          ;(R6) IS THE STACK POINTER
   620                          ;((R6)) IS THE PC+2 OF LOCATION WHERE THE TRAP ORIGINATED
   621                          ;FOR NORMAL OPERATION RUN WITH ALL SWITCHES DOWN
   622                          ;SR 15=1 OR UP---HALT ON ERROR
   623                          ;SR 14=1 OR UP---SCOPE LOOP
   624                          ;SR 13=1 OR UP---INHIBIT PRINT OUT
   625                          ;SR 12=1 OR UP---INHIBIT TRACE TRAPPING
   626                          ;SR 11=1 OR UP---INHIBIT SUB-PROBLEM ITERATION
   627                          ;SR 10=1 OR UP---INHIBIT PROCESSOR TEST
   628                          ;SR 09=1 OR UP INHIBIT VARIABLE CORE EXPANSION
   629                          ;SR 08=1 OR UP RESTART ON ERROR
   630                          ;SPECIAL DELETE SWITCHES-SET RESPECTIVE SWITCH TO A 1 TO INHIBIT INITIATION OF DEVICE
   631
   632                          ;SW 0=1 INHIBIT TTY OUTPUT
   633                          ;SW 1=1 INHIBIT TTY INPUT
   634                          ;SW 2=1 INHIBIT HSP
   635                          ;SW 3=1 INHIBIT HSR
   636                          ;SW 4=1 INHIBIT LINE CLOCK
   637                          ;SW 5=1 INHIBIT RC, RF, RK, RP DISKS
   638                          ;SW 6=1 INHIBIT TC11 DECTAPE
   639                          ;SW 7=1 INHIBIT LINE PRINTER --- IF LINE PRINTER IS USED, MUST RESTART AT 502
   640                          ;IF EAE EXIST IT WILL BE AUTOMATICALLY SELECTED.
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                                ;PDP11 SIMULTANEOUS I/O
            000060                      .=60
000060  001522                  TTYINR                  ;TTY IN INTERRUPT VECTOR
000062  000200                  200
000064  001576                  TYOUTR                  ;TTY OUT INTERRUPT VECTOR
000066  000200                  200
000070  001624                  HSRINR                  ;HSR INTERRUPT VECTOR
000072  000200                  200
000074  001716                  HPOUTR                  ;HSP INTERRUPT VECTOR
000076  000200                  200
            000100              .=100
000100  002022                  LK3                     ;INTERRUPT VECTOR LINE CLOCK
000102  000300                  300                     ;LEVEL SIX PRIORITY
            00004               .=4
000004  017456                  .PARSRV                 ;MEMORY PARITY
000006  000340                  340

            000174              .=174
000174  177570          SRPTR:  177570
000176  000000          SOFTSR: 000000
            000200              .=200
000200  000137  000502          JMP     @#START
            000204              .=204
000204  002610                  IRF                     ;RF11 DISK
000206  000240                  240                     ;LEVEL 5
000210  002512                  IRC                     ;RC DISK
000212  000240                  240

            000214              .=214
000214  002674                  FENDZ                   ;DEC TAPE
000216  000300                  300                     ;LEVEL 6
            000220              .=220
000220  002322                  IRK                     ;RK DISK
000222  000240                  240

            000254              .=254
000254  002426                  IRP                     ;RP DISK
000256  000240                  240

            177776          STATUS=177776
000260  177560          TRCSR:  177560
000262  177562          TRDR:   177562
000264  177564          TTCSR:  177564
000266  177566          TTDBR:  177566
000270  177550          HRCSR:  177550
000272  177552          HRDBR:  177552
000274  177554          HPCSR:  177554
000276  177556          HPDBR:  177556
000300  177546          LKCSR:  177546
000302  177514          LPCSR:  177514
000304  177516          LPDBR:  177516
000306  177470          RFDAE:  177470          ;DISK ADDRESS AND ERROR
000310  177466          RFDAR:  177466          ;DISK ADDRESS REGISTER
000312  177462          RFWC:   177462          ;WORD COUNT REGISTER
000314  177464          RFCAR:  177464          ;CURRENT ADDRESS REGISTER
000316  177460          RFCSR:  177460          ;STATUS REGISTER
```

```
                                RFCSRH: 177461          ;HIGH BYTE ADDRESS OR CSR
                                RCDAR:  177460          ;DISK ADDRESS REGISTER
                                RCWC:   177450          ;WORD COUNT REGISTER
                                RCBAR:  177452          ;CURRENT ADDRESS REGISTER
                                RCCSR:  177440          ;STATUS REGISTER
                                RCCSRH: 177447          ;HIGH BYTE ADDRESS OR CSR
                                RKDAH:  177413          ;HIGH BYTE OF DISK ADDRESS
                                RKDAE:  177412          ;DISK ADDRESS REGISTER
                                RKWC:   177406          ;WORD COUNT REGISTER
                                RKBAR:  177410          ;CURRENT ADDRESS REGISTER
                                RKCSR:  177404          ;STATUS REGISTER
                                RKCSRH: 177405          ;HIGH BYTE ADDRESS OR CSR
                                MD:     177300          ;EAE LOCATIONS
                                MQ:     177302
                                SC:     177310
                                SRE:    177311
                                MUL:    177306
                                DIV:    177308
                                NOR:    177312
                                LSH:    177314
                                ASH:    177316

                                ;DECIAPE ADDRESSES
                                TC=177340
                                TCCM:   TC+2            ;CONTROL AND FUNCTION
                                TCST:   TC              ;GENERAL STATUS
                                TCDT:   TC+10
                                        BR      START
                                TCWC:   TC+4            ;DATA
                                TCBA:   TC+6            ;WORD COUNT
                                TCIV:   214             ;BUS ADDRESS
                                RPCA:   176722          ;DECTAPE INTERRUPT VECTOR
                                RPDAH:  176725          ;CYLINDER ADDRESS RPII DISK
                                RPDAE:  176724          ;HIGH BYTE OF DISK ADDRESS
                                RPDSR:  176710          ;DISK ADDRESS
                                RPDAR:  176724          ;DRIVE STATUS REGISTER
                                RPWC:   176716          ;DISK ADDRESS REGISTER
                                RPBAR:  176720          ;WORD COUNT REGISTER
                                RPCSR:  176714          ;CURRENT ADDRESS REGISTER
                                RPCSRH: 176715          ;STATUS REGISTER
                                RPFUNCTION:     0       ;HIGH BYTE ADDRESS OR CSR
                                                        ;DISK COMMAND
                                ;THIS ROUTINE CHECKS THE READ DATA BUFFER TC11
                                ;BY DOING A CHECK SUM ON THE DATA
                                TC1:    MOV     %1,-(6)         ;SAVE THESE ON THE STACK
                                        MOV     %3,-(6)
                                        CLR     %3              ;SUM OF DATA
                                        MOV     #TCRBUF,%1      ;ADDRESS OF READ BUFFER
                                TC2:    ADD     (1)+,%3         ;EVEN ADD
                                        ADD     (1)+,%3         ;ODD ADD -2'S COMPLIMENT
                                        BEQ     TC2
                                        CMP     %1,#TCRBUF+1000         ;AT END OF BUFFER?
                                        BHI     .+4             ;YES BRANCH
                                        HLT                     ;DATA ERROR
                                        MOV     (6)+,%3         ;RESTORE THE REGISTERS
                                        MOV     (6)+,%1
                                        RTS     %7              ;EXIT
```

```
000472  012767  000240  014232  NOEAE:  MOV     #240,EAESRT             ;BRANCH AROUND EAE ROUTINE
000500  000002                          RTI                             ;JUMP OVER EAE SECTION

                                ;START UP FOR MINI MONITOR
                                ;RESTART HERE IF LINE PRINTER WAS ENABLED

000502  012767  016504  177314  START:  MOV     #PFAIL,24               ;SET POWER FAIL VECTOR
000510  012706  016762                  MOV     #BUFF,%6                ;SET UP STACK
000514  012767  000530  177262          MOV     #1$,4                           ;SET UP TIME OUT VECTOR
000522  005777  177446                  TST     @SRPTR                          ;TRY TO REFERENCE THE
                                                                                ;HARDWARE SWITCH REGISTER
000526  000404                          BR      2$                              ;BRANCH IF NO TIME OUT TRAP OCCURRS
000530  012767  000176  177436  1$:     MOV     #SOFTSR,SRPTR                   ;CHANGE THE SWITCH REGISTER POINTER
                                                                                ;TO POINT TO A SOFTWARE  SWITCH REGISTER
000536  022626                          CMP     (6)+,(6)+                       ;RESTORE THE STACK
000540  012767  000006  177236  2$:     MOV     #6,4                            ;RESTORE TIME OUT VECTOR
000546  017767  177422  000742          MOV     @SRPTR,REG1                     ;MOV SR TO REGISTER
000554  005737  016570                  TST     @#SAVR6                 ;SET ON POWER FAIL
000560  001403                          BEQ     ESTART
000562  005037  016570                  CLR     @#SAVR6
000566  104000                          HLT                             ;A POWER FAIL OCCURRED
000570  005067  015644          ESTART: CLR     ICOUNT
000574  012706  016762                  MOV     #BUFF,%6                ;SET UP STACK
000600  012767  000642  015636          MOV     #START2,RETURN
000606  005067  015630                  CLR     SCOPEF
000612  012767  000340  177156          MOV     #340,STATUS                     ;LOCK OUT INTERRUPTS
000620  005067  014736                  CLR     PRFLAG                          ;PRINT ROUTINE BUSY
000624  016702  000666                  MOV     REG1,RSR                        ;SAVE SWITCHES
000630  012700  000100                  MOV     #100,R100                       ;INTERRUPT ENABLE
000634  012701  000101                  MOV     #101,R101                       ;INTERRUPT ENABLE AND GO
000640  104400                          SCOPE
000642  050077  177412          START2: BIS     R100,@TRCSR
000646  000005                          RESET
000650  030077  177404                  BIT     R100,@TRCSR                     ;INTERRUPT ENABLE
000654  001401                          BEQ     .+4
000656  104000                          HLT                                     ;RESET DID NOT CLEAR INTERRUPT ENABLE
000660  104400                          SCOPE
                                ;DOES "RESET" ON THE BUS LAST TOO LONG
000662  012706  016762                  MOV     #BUFF,%6                        ;SET UP STACK
000666  000005                          RESET
000670  050077  177370                  BIS     R100,@TTCSR                     ;SET A BIT
000674  030077  177364                  BIT     R100,@TTCSR                     ;IS IT SET
000700  001001                          BNE     .+4
000702  104000                          HLT                                     ;RESET IS ON BUS TOO LONG
000704  005077  177354                  CLR     @TTCSR
000710  104400                          SCOPE
000712  050077  177346                  BIS     R100,@TTCSR
000716  005077  177342                  CLR     @TTCSR                          ;IF BUS HANG, CHECK NO SACK TIMEOUT
000722  104400                          SCOPE
000724  000005                          RESET
000726  012767  004416  015510          MOV     #BEGIN,RETURN
000734  012737  000472  000004          MOV     #NOEAE,@#4                      ;TEST FOR EAE
000742  005777  177402                  TST     @MQ                             ;TRAP IF NONEXISTANT
000746  012767  001520  177030          MOV     #RTIA,4                         ;SET UP FOR NON-EXISTANT I/O
000754  012767  000340  177024          MOV     #340,6                          ;KEEP NEW PSW AT 340
000762  012767  000001  000604          MOV     #1,DATA1                        ;BASE DATA FOR TTY READER OR KEYBOARD
```

```
                                                CLR     DATA2           ;BASE DATA FOR TTY PUNCH OR TELEPRINTER
                                                MOV     #1,DATA3        ;BASE DATA FOR HSR
                                                CLR     DATA4           ;BASE DATA FOR HSP
                                                MOV     #BUFF,%6
                                                CLR     DELAY           ;FOR READER STALL - HSR -
                                                MOV     #340,STATUS     ;LOCK OUT INTERRUPTS
                                                BIT     RSR,#1
                                                BNE     ST1
                                                BIS     R100,@TTCSR     ;TTY OUT
                                        ST1:    BIT     RSR,#2
                                                BNE     ST2
                                                BIS     R101,@TRCSR     ;TTY IN
                                        ST2:    TST     @HPCSR          ;TEST FOR OUT OF TAPE
                                                BMI     ST3
                                                BIT     RSR,#4
                                                BNE     ST3
                                                BIS     R100,@HPCSR     ;HSP
                                        ST3:    TST     @HRCSR          ;TEST FOR OUT OF TAPE
                                                BMI     ST4
                                                BR      ST3A            ;RESERVED FOR OVERLAYS
                                                DET3                    ;1020 GTP OVER LAY
                                                DET3                    ;1022 GTP OVER LAY
                                        ST3A:   BIT     RSR,#10
                                                BNE     ST4
                                                MOV     R100,DELAY      ;FOR STALL HSR
                                                BIS     R101,@HRCSR     ;HSR
                                        ST4:    BIT     RSR,#20
                                                BNE     ST5
                                                CLR     TIME
                                                BIS     R100,@LKCSR     ;LINE CLOCK 50 OR 60 CYCLES
                                        ST5:    BIT     RSR,#40
                                                BNE     ST6
                                                MOV     #ST5A,4
                                                TSTB    @RPCSR          ;WAIT FOR CONTROLLER READY
                                                BPL     .-4
                                                MOV     #15,@RPCSR      ;RESET DRIVE
                                                TSTB    @RPCSR          ;WAIT FOR CONTROLLER READY
                                                BPL     .-4
                                                TST     @RPDSR          ;WAIT FOR ACCESS READY
                                                BPL     .-4
                                                CLR     @RPDSR          ;CLR ATTENTION
                                        ST5A:   MOV     #RTIA,4
                                                MOV     #37,@RCDAR
                                                MOV     #43503,RFFUNCTION       ;WRITE CHECK/WRITE RF
                                                MOV     #43503,RCFUNCTION
                                                MOV     #43503,RKFUNCTION
                                                MOV     #43503,RPFUNCTION
                                                MOVB    R100,@RFCSR             ;TELL DISK TO READ OR WRITE
                                                MOVB    R100,@RKCSR
                                                MOVB    R100,@RCCSR
                                                MOVB    R100,@RPCSR
                                        ST6:    BIT     RSR,R100        ;TEST FOR DECTAPE
                                                BNE     ST7
                                                MOV     #TCFIRST,TCEXPE ;FIRST BLOCK SHOULD BE ZERO
                                                MOV     #FENDZ,@TCIV    ;GO TO END ZONE ON INTERRUPT
                                                MOV     #R+IE+RB+DO,@TCCM       ;MOVE REVERSE
```

```
                                ST7:    TSTB    RSR                     ;LINE PRINTER
                                        BMI     ST8
                                        MOV     #ST8,4                  ;DON'T CHANGE 200
                                        MOV     #137,SOLPAT             ;RESET FOR START OF LINE PATTERN
                                        MOV     LP6+4,CLINCT            ;LINE COUNT
                                        MOV     #40,CURPAT
                                        MOV     #14,@LPDBR              ;LINE FEED TO POSITION BUFFER
                                        MOV     #LPINTR,@#200           ;INTERRUPT VECTOR
                                        MOV     #200,@#202              ;PROCESSOR LEVEL 4
                                        MOV     R100,@LPCSR             ;INTERRUPT ENABLE
                                ST8:    CLR     @#TRPB                  ;NO "T" BIT FIRST PASS
                                ;IF OPERATION WITH DIAGNOSTIC PACKAGE OR ACT11
                                        TST     42
                                        BEQ     ST8A            ;BRANCH IF NO MONITOR
                                        MOV     #RTIA,4
                                        CLR     @LPCSR          ;NO LINE PRINTER WITH MONITOR
                                        CLR     @TTCSR          ;NO CONSOLE TEST WITH MONITOR
                                        CMPB    @#2,    41      ;IS IT RKDP
                                        BNE     ST8A
                                        CLR     @RKCSR          ;YES DON'T TEST RK DISK
                                ST8A:   JSR     %7,@#USER               ;FOR USER I/O PROGRAM
                                        JSR     %7,DETI                 ;CHECK FOR CORE EXPANSION
                                        CLR     6                       ;HALT FOR BUS ERROR
                                        MOV     #6,4                    ;FOR USER I/O PROGRAM
                                        CLR     STATUS                  ;ALLOW INTERRUPTS
                                        BR      .+4
                                MAINLINE:       WAIT                    ;WAIT HERE FOR INTERRUPTS
                                        BIT     @SRPTR,#2000            ;INHIBIT PROCESSOR TEST
                                        BNE     MAINLINE
                                        JMP     BEGIN
                                REG1:   0                               ;STATUS OF SELECTED DEVICES
                                RTIA:   RTI                             ;AN RTI FOR NON EXISTANT I/O


                                ;TTY RECEIVER VALUES 0 TO 377

                                TTYINR: TSTB    @TRCSR                  ;IS DONE SET
                                        BMI     .+4
                                        HLT                             ;FALSE RETURN FROM MAINLINE
                                        TSTB    @TRDR                   ;TEST DATA FOR LEADER
                                        BEQ     TTYIN2                  ;IF LEADER GO BACK
                                        CMPB    @TRDR,DATA1             ;NOT LEADER TEST FOR DATA
                                        BEQ     TTYIN3
                                        HLT                             ;DATA COMPARISON ERROR
                                TTYIN3: INCB    DATA1                   ;INCREMENT DATA
                                TTYIN4: BNE     TTYIN2
                                TTYIN1: MOV     #1,DATA1                ;BASE DATA
                                TTYIN2: INC     @TRCSR                  ;START READER
                                        RTI                             ;RETURN TO MAINLINE

                                DATA1:  XX                              ;EXPECTED DATA


                                ;TTY TRANSMITTER PRINT VALUES 0 TO 377
```

```
001576  105777  176462          TYOUTR:  TSTB   @TTCSR          ;TEST FOR DONE
001602  100401                           BMI    .+4             ;BRANCH IF FLAG FOUND
001604  104000                           HLT                    ;FALSE INTERRUPT RETURN
001606  105267  000010                   INCB   DATA2           ;INCREMENT DATA
001612  016777  000004  176446  TYOUT1:  MOV    DATA2,@TTDBR    ;OUTPUT TO DEVICE
001620  000002                           RTI                    ;RETURN TO MAINLINE

001622  000000                  DATA2:   XX                     ;TRANSMITTED DATA
                                ;HSR SECTION VALUES 0 TO 377

001624  105777  176440          HSRINR:  TSTB   @HRCSR          ;IS DONE SET
001630  100401                           BMI    .+4
001632  104000                           HLT                    ;FALSE RETURN FROM MAINLINE
001634  105777  176432                   TSTB   @HRDBR          ;TEST DATA FOR LEADER
001640  001413                           BEQ    HSRIN2          ;IF LEADER GO BACK
001642  127767  176424  000026           CMPB   @HRDBR,DATA3    ;NOT LEADER TEST FOR DATA
001650  001401                           BEQ    .+4
001652  104000                           HLT                    ;DATA COMPARISON ERROR
001654  105267  000016                   INCB   DATA3           ;INCREMENT DATA
001660  001003                           BNE    HSRIN2
001662  012767  000001  000006  HSRIN1:  MOV    #1,DATA3        ;BASE DATA
001670  005277  176374          HSRIN2:  INC    @HRCSR          ;START READER
001674  000002                           RTI                    ;RETURN TO MAINLINE

001676  000000                  DATA3:   XX                     ;EXPECTED DATA


                                ;HS PUNCH SECTION, VALUES 0 TO 377
                                ;ENABLE READER ON FIX COUNT OF PUNCH ONLY (14 TIMES)
001700  012767  000000  000064  HPOUT:   MOV    #0,DATA4        ;INITAL DATA
001706  016777  000060  176362  HPOUT1:  MOV    DATA4,@HPDBR    ;OUTPUT TO DEVICE
001714  000002                           RTI                    ;RETURN TO MAINLINE
001716  105777  176352          HPOUTR:  TSTB   @HPCSR          ;TEST FOR DONE
001722  100401                           BMI    .+4             ;BRANCH IF FLAG FOUND
001724  104000                           HLT                    ;FALSE INTERRUPT RETURN
001726  046777  000044  176334           BIC    DELAY,@HRCSR    ;CLEAR HSR INTERRUPT ENABLE
001734  005267  000034                   INC    INTCNT          ;COUNT INTERRUPTS
001740  026727  000030  000014           CMP    INTCNT,#14      ;SAVE TO TURN READER ON?
001746  001005                           BNE    HPOUT2          ;NO-NEED MORE TIME
001750  005067  000020                   CLR    INTCNT          ;YES RESET COUNTER
001754  056777  000016  176306           BIS    DELAY,@HRCSR    ;SET READER INT ENABLE
001762  105267  000004          HPOUT2:  INCB   DATA4           ;INCREMENT DATA
001766  001744                           BEQ    HPOUT           ;AT UPPER LIMIT START OVER
001770  000746                           BR     HPOUT1          ;FINISH REST OF DATA

001772  000000                  DATA4:   XX
001774  000000                  INTCNT:  0
001776  000000                  DELAY:   0                      ;EQUAL 100 IF HSR RUNNING

                                ;TEST OF LINE CLOCK, INTERRUPT FOR 55 SECONDS THEN STALL FOR 5 SECONDS.
002000  005037  002116          LK1:     CLR    @#TIME          ;CLEAR LINE CLOCK TIMER
002004  052777  000100  176266           BIS    #100,@LKCSR
002012  052737  000100  177776           BIS    #100,@#STATUS
002020  000002                  LK2:     RTI                    ;RETURN TO MAINLINE
002022  105777  176252          LK3:     TSTB   @LKCSR          ;TEST FOR DONE
002026  100401                           BMI    .+4
002030  104000                           HLT                    ;FALSE INTERRUPT
```

```
  977  002032  042777  000200  176240          BIC     #200,@LKCSR
  978  002040  005237  002116          LK4:    INC     @#TIME          ;ON INTERUPTS ENTER HERE
  979  002044  022737  006344  002116          CMP     #3300.,@#TIME   ;A LAPS OF 55 SECONDS
  980  002052  103362                          BHIS    LK2             ;BRANCH IF TIME LESS THAN 55 SECONDS
  981  002054  042777  000100  176216          BIC     #100,@LKCSR
  982  002062  042737  000100  177776          BIC     #100,@#STATUS   ;LOWER PRIORITY
  983  002070  022737  007020  002116          CMP     #3600.,@#TIME   ;ONE MINUTE UP
  984  002076  001740                          BEQ     LK1             ;YES-RESET TIMER
  985  002100  105777  176174                  TSTB    @LKCSR          ;NO-SKIP ON FLAG TILL IT IS.
  986  002104  100375                          BPL     .-4
  987  002106  042777  000200  176164          BIC     #200,@LKCSR     ;CLEARS THE FLAG
  988  002114  000751                          BR      LK4             ;FOUND FLAG GO INCREMENT COUNTER
  989  002116  000000                  TIME:   0
  990
  991                                          ;LINE PRINTER SHOULD RAISE PROCESSOR PRIORITY TO LEVEL OF LINE PRINTER
  992                                          ;INTERRUPT VECTOR IS 200
  993          002160                          LPB0=LP6+4
  994
  995  002120  016767  000142  000136  LP1:    MOV     SOLPAT,CURPAT   ;START OF LINE TO CURRENT
  996  002126  016777  000132  176150  LP2:    MOV     CURPAT,@LPDBR   ;CURRENT PATTERN TO LINE PRINTER
  997  002134  105777  176142                  TSTB    @LPCSR
  998  002140  100405                          BMI     LP6
  999  002142  000002                          RTI                     ;RETURN TO MAIN LINE
 1000  002144  105777  176132          LPINTR: TSTB    @LPCSR          ;TEST FOR FLAG
 1001  002150  100401                          BMI     .+4
 1002  002152  104000                          HLT                     ;FALSE RETURN FROM MAIN LINE
 1003  002154  026727  000110  000117  LP6:    CMP     CLINCT,#79.     ;TEST FOR END OF LINE,
 1004                                                                   ;CHANGE THIS VALUE FOR 132 COLUMN PRINTER
 1005  002162  001415                          BEQ     LP4             ;GO GENERATE CR/LF
 1006  002164  005267  000100                  INC     CLINCT          ;INCREMENT LINE POSITION COUNT
 1007  002170  026727  000070  000137          CMP     CURPAT,#137     ;TEST FOR MAXIMUM PATTERN
 1008  002176  001403                          BEQ     LP3             ;YES - GO TO LP3 AND RESET
 1009  002200  005267  000060                  INC     CURPAT          ;NO - INCREMENT TO NEXT PATTERN
 1010  002204  000750                          BR      LP2             ;GO SEND IT TO LINE PRINTER
 1011  002206  012767  000040  000050  LP3:    MOV     #40,CURPAT      ;RESET PATTERN AND SEND TO PRINTER
 1012  002214  000744                          BR      LP2             ;SENT TO LINE PRINTER
 1013  002216  005067  000046          LP4:    CLR     CLINCT          ;RESET LINE COUNT
 1014  002222  012777  000012  176054          MOV     #12,@LPDBR      ;LINE FEED
 1015  002230  105777  176046                  TSTB    @LPCSR
 1016  002234  100375                          BPL     .-4
 1017  002236  026727  000024  000137          CMP     SOLPAT,#137     ;START OF LINE PATTERN
 1018  002244  001403                          BEQ     LP5
 1019  002246  005267  000014                  INC     SOLPAT          ;INCREMENT START OF LINE
 1020  002252  000722                          BR      LP1
 1021  002254  012767  000040  000004  LP5:    MOV     #40,SOLPAT      ;RESET START OF LINE
 1022  002262  000716                          BR      LP1             ;PRINT
 1023  002264  000000                  CURPAT: 0                       ;CURRENT CHARACTER BEING PRINTED
 1024  002266  000000                  SOLPAT: 0                       ;START OF LINE CHARACTER
 1025  002270  000000                  CLINCT: 0                       ;POSITION OF LINE
 1026
 1027                                          ;RK11 DISK TEST INTERRUPT LEVEL 5, 2000 WORD TRANSFERS
 1028  002272  005077  176040          RKSTART:        CLR     @RKDAE  ;INITIALIZE DISK - DAR-DAE
 1029  002276  016777  000360  176036  RK1:    MOV     LLIMIT,@RKBAR   ;CORE BASE
 1030  002304  012777  176000  176026          MOV     #RKWORDCT,@RKWC ;LENGTH OF TRANSFER
 1031  002312  113777  002364  176024          MOVB    @#RKFUNCTION,@RKCSR     ;WRITE OR WRITE CHECK TO DISK
 1032  002320  000002                          RTI                     ;RETURN TO MAINLINE CODE
```

```
1033  002322  032777  100200  176014  IRK:    BIT     #100200,@RKCSR          ;INTERRUPT VECTOR POINTS HERE
1034  002330  003002                          BGT     .+6
1035  002332  104000                          HLT                             ;RK-11 ERROR FLAG UP OR READY NOT UP
1036  002334  000756                          BR      RKSTART
1037  002336  032777  000037  175772          BIT     #37,@RKDAE              ;DISK AT UPPER LIMIT?
1038  002344  001354                          BNE     RK1             ;NO
1039  002346  122777  000031  175760          CMPB    #31,@RKDAH
1040  002354  001350                          BNE     RK1                     ;NO
1041  002356  000337  002364                  SWAB    @#RKFUNCTION            ;CHANGE COMMAND
1042  002362  000743                          BR      RKSTART                 ;RESTART NEW TRANSFER OF DISK
1043
1044  002364  000000                  RKFUNCTION:     0                       ;DISK COMMAND
1045                                  ;RP11 DISK SERVICE ROUTINE
1046  002366  112777  000001  176032  RPSTART: MOVB    #1,@RPCSR               ;INITIALIZE DISK - DAR-DAE
1047  002374  105777  176026                  TSTB    @RPCSR
1048  002400  100375                          BPL     .-4
1049  002402  016777  000254  176014  RP1:    MOV     LLIMIT,@RPBAR           ;INITIAL CORE ADDRESS
1050  002410  012777  176000  176004          MOV     #RPWORDCT,@RPWC         ;LENGTH OF TRANSFER
1051  002416  113777  000432  176002          MOVB    @#RPFUNCTION,@RPCSR     ;WRITE OR WRITE CHECK TO DISK
1052  002424  000002                          RTI                             ;RETURN TO MAINLINE CODE
1053  002426  032777  100200  175772  IRP:    BIT     #100200,@RPCSR                 ;INTERRUPT VECTOR POINTS HERE
1054  002434  003002                          BGT     .+6
1055  002436  104000                          HLT                             ;RP11 READY NOT UP OR ERROR
1056  002440  000752                          BR      RPSTART
1057  002442  122777  000312  175740          CMPB    #312,@RPCA              ;CYLINDER NO. 312, 624 FOR RP03
1058  002450  001354                          BNE     RP1                     ;NO
1059  002452  000337  000432                  SWAB    @#RPFUNCTION            ;CHANGE COMMAND
1060  002456  000743                          BR      RPSTART                 ;RESTART NEW TRANSFER OF DISK
1061                                  ;RC11 DISK SERVICE ROUTINE
1062  002460  012777  000040  175634  RCSTART: MOV     #40,@RCDAR              ;INITIALIZE DISK - DAR-DAE
1063  002466  016777  000170  175632  RC2:    MOV     LLIMIT,@RCBAR           ;CORE BASE
1064  002474  012777  176040  175622          MOV     #RCWORDCT,@RCWC         ;LENGTH OF TRANSFER
1065  002502  113777  002550  175620          MOVB    @#RCFUNCTION,@RCCSR     ;WRITE OR WRITE CHECK TO DISK
1066  002510  000002                          RTI                             ;RETURN TO MAINLINE CODE
1067  002512  037727  175612  100200  IRC:    BIT     @RCCSR,#100200          ;INTERRUPT VECTOR POINTS HERE
1068  002520  003002                          BGT     .+6
1069  002522  104000                          HLT                             ;RC11 READY NOT UP OR ERROR IS UP
1070  002524  000755                          BR      RCSTART
1071  002526  005277  175570                  INC     @RCDAR                  ;TO INCREASE XFER RATE
1072  002532  022777  002000  175562          CMP     #2000,@RCDAR            ;DISK AT UPPER LIMIT, 4000=2, 6000=3, 10000=4
1073  002540  001352                          BNE     RC2                     ;NO
1074  002542  000337  002550                  SWAB    @#RCFUNCTION            ;CHANGE COMMAND
1075  002546  000744                          BR      RCSTART                 ;RESTART NEW TRANSFER OF DISK
1076  002550  000000                  RCFUNCTION:     0                       ;DISK COMMAND
1077                                  ;RF11 DISK
1078  002552  105277  175542          RFSTART:        INCB    @RFCSRH         ;INITIALIZE DISK - DAR-DAE
1079  002556  062777  000040  175524                  ADD     #40,@RFDAR              ;INCREASE DUTY CYCLE
1080  002564  016777  000072  175522  RF1:    MOV     LLIMIT,@RFCAR           ;CORE BASE
1081  002572  012777  176040  175512          MOV     #RFWORDCT,@RFWC         ;LENGTH OF TRANSFER
1082  002600  113777  002660  175510          MOVB    @#RFFUNCTION,@RFCSR     ;WRITE OR WRITE CHECK TO DISK
1083  002606  000002                          RTI                             ;RETURN TO MAINLINE CODE
1084  002610  037727  175502  100200  IRF:    BIT     @RFCSR,#100200          ;INTERRUPT VECTOR POINTS HERE
1085  002616  003002                          BGT     .+6
1086  002620  104000                          HLT                             ;RF11 READY NOT UP OR ERROR UP
1087  002622  000753                          BR      RFSTART
1088  002624  062777  000040  175456          ADD     #40,@RFDAR              ;INCREASE DUTY CYCLE
```

```
1089  002632  122777  000003  175446          CMPB    #3,@RFDAE       ;DISK AT UPPER LIMIT? 7=2, 17=4, 37=8
1090  002640  001351                          BNE     RF1             ;NO
1091  002642  027727  175442  174000          CMP     @RFDAR,#174000  ;AS FAR ON DISK AS WE CAN GO
1092  002650  101745                          BLOS    RF1             ;NO
1093  002652  000337  002660                  SWAB    @#RFFUNCTION    ;CHANGE COMMAND
1094  002656  000735                          BR      RFSTART         ;RESTART NEW TRANSFER OF DISK
1095  002660  000000              RFFUNCTION: 0                       ;DISK COMMAND
1096  002662  004416              LLIMIT: BEGIN                       ;FIRST CORE ADDRESS OF TRANSFER
1097                                :DT11 DEC TAPE
1098          000004              RD=4                        ;READ DATA
1099          000014              WD=14                       ;WRITE DATA
1100          000002              RB=2
1101          000002              BR=2                        ;READ BLOCK
1102          000000              F=0                         ;FORWARD
1103          000500              IE=500                      ;INTERRUPT ENABLE AND UNIT - UNIT #1
1104          000001              DO=1                        ;DO - THE FUNCTION
1105          004000              R=4000                      ;REVERSE
1106
1107  002664  000000              TCFIRST:        0           ;FIRST BLOCK TO BE SEARCHED FOR
1108  002666  001101              TCLAST: 577.                ;LAST BLOCK TO BE SEARCHED FOR
1109  002670  000000              TCBLK:  0                   ;CURRENT BLOCK FOUND
1110  002672  000000              TCEXPE: 0                   ;THE BLOCK THAT IS EXPECTED
1111
1112                              ;GO TO FORWARD END ZONE
1113  002674  012777  002674  175504  FENDZ:  MOV     #FENDZ,@TCIV    ;END ZONE VECTOR SETUP
1114  002702  005777  175466                  TST     @TCST           ;TEST FOR END ZONE
1115  002706  100403                          BMI     FEND1           ;AT END ZONE?
1116  002710  105277  175456                  INCB    @TCCM           ;SET DO - NO DELAY
1117  002714  000002                          RTI                     ;NO - WAIT SOME MORE
1118  002716  012777  002746  175462  FEND1:  MOV     #TCF1,@TCIV     ;YES - NEW VECTOR
1119  002724  042777  104000  175440          BIC     #104000,@TCCM   ;SEARCH BLOCK FOWARD
1120  002732  016767  177726  177732          MOV     TCFIRST,TCEXPE  ;COUNT WHEN THIS BLOCK IS FOUND
1121  002740  105277  175426          TCF1A:  INCB    @TCCM           ;SET DO
1122  002744  000002                          RTI                     ;RETURN ON NEXT BLOCK
1123  002746  032777  100200  175416  TCF1:   BIT     #100200,@TCCM   ;ANY ERROR ON READ?
1124  002754  003001                          BGT     .+4
1125  002756  104000                          HLT                     ;TC ERROR SET - FORWARD READ BLOCK
1126  002760  027767  175412  177704          CMP     @TCDT,TCEXPE    ;IS THIS OUR BLOCK FOR SYNC
1127  002766  002764                          BLT     TCF1A           ;NO-READ SOME MORE BLOCKS
1128  002770  001401                          BEQ     TCF2            ;YES
1129  002772  104000                          HLT                     ;WE PASSED THE BLOCK
1130
1131  002774  012777  003010  175404  TCF2:   MOV     #TCF3,@TCIV     ;VECTOR FOR SEQUENTIAL READS
1132  003002  105277  175364                  INCB    @TCCM           ;SET DO
1133  003006  000002                          RTI                     ;RETURN AND TEST SEQENTIAL BLOCKS
1134
1135                              ;FIND SEQUENTIAL BLOCK AT FOWARD DIRECTION
1136  003010  032777  100200  175354  TCF3:   BIT     #100200,@TCCM   ;TEST ERROR AND READY
1137  003016  003001                          BGT     .+4
1138  003020  104000                          HLT                     ;FALSE INTERRUPT ON TC-11
1139  003022  027767  175350  177636          CMP     @TCDT,TCLAST    ;HAVE WE TESTED ALL BLOCKS
1140  003030  001414                          BEQ     RENDZ           ;YES DRIVE UNIT IN END ZONE TO START OVER
1141  003032  005267  177634                  INC     TCEXPE          ;NO-INCREMENT EXPECTED COUNT
1142  003036  027767  175334  177626          CMP     @TCDT,TCEXPE    ;IS CURRENT BLOCK CORRECT
1143  003044  001401                          BEQ     .+4
1144  003046  104000                          HLT                     ;FAILED IN FOWARD READ TO FIND NEXT BLOCK
```

```
1145  003050  000427                          BR      TCWBK           ;THIS ROUTINE WRITES A BLOCK
1146  003052  105277  175314          TCF4:   INCB    @TCCM           ;SET DO
1147  003056  000002                          RTI
1148  003060  000705                  XFENDZ: BR      FENDZ           ;INDIRECT LINK
1149
1150                                  ;MOVE TAPE TO REVERSE END ZONE
1151  003062  012777  003062  175316  RENDZ:  MOV     #RENDZ,@TCIV    ;END ZONE VECTOR SETUP
1152  003070  016767  177572  177574          MOV     TCLAST,TCEXPE   ;SET UP FOR REVERSE SEARCH
1153  003076  005777  175272                  TST     @TCST           ;IN END ZONE
1154  003102  100403                          BMI     REND1           ;YES - START TO TURN UNIT AROUND
1155  003104  105277  175262                  INCB    @TCCM           ;SET DO
1156  003110  000002                          RTI                     ;NO - WAIT TILL WE ARE
1157  003112  012777  004503  175252  REND1:  MOV     #R+IE+RB+DO,@TCCM ;FUNCTION = READ BLOCK, REVERSE AND GO
1158  003120  012777  003210  175260          MOV     #TCR1,@TCIV     ;SET UP NEW INTERRUPT VECTOR
1159  003126  000002                          RTI
1160                                  ;WRITE FORWARD ALL BLOCKS EXCEPT 0
1161
1162  003130  012777  003162  175250  TCWBK:  MOV     #TCWB1,@TCIV    ;INTERRUPT VECTOR FOR WRITE
1163  003136  012777  177400  175236          MOV     #-400,@TCWC     ;ONE BLOCK
1164  003144  012777  003416  175232          MOV     #TCWBUF,@TCBA   ;THE WRITE BUFFER ADDRESS
1165  003152  112777  000515  175212          MOVB    #IE+WD+DO,@TCCM ;WRITE THE BLOCK
1166  003160  000002                          RTI                     ;RETURN WHEN BLOCK IS WRITTEN
1167  003162  005777  175204          TCWB1:  TST     @TCCM           ;ANY ERRORS
1168  003166  100001                          BPL     .+4
1169  003170  104000                          HLT
1170  003172  012777  003010  175206          MOV     #TCF3,@TCIV     ;SEARCH BLOCK VECTOR
1171  003200  112777  000502  175164          MOVB    #IE+RB,@TCCM    ;READ BLOCK
1172  003206  000721                          BR      TCF4            ;FIND THE NEXT BLOCK
1173
1174  003210  032777  100200  175154  TCR1:   BIT     #100200,@TCCM   ;TEST FOR ERROR AND READY
1175  003216  003001                          BGT     .+4
1176  003220  104000                          HLT                     ;DECTAPE ERROR ON READ BLOCK REVERSE
1177  003222  027767  175150  177442          CMP     @TCDT,TCEXPE    ;IS IT OUR FIRST BLOCK
1178  003230  001406                          BEQ     TCR2            ;YES - GO TEST THE REST
1179  003232  002002                          BGE     TCR1A           ;NO - HAVE WE PASSED THE BLOCK
1180  003234  104000                          HLT                     ;WE PASS OUR BLOCK
1181  003236  000711                          BR      RENDZ           ;GO TO END ZONE AND TRY AGAIN
1182  003240  105277  175126          TCR1A:  INCB    @TCCM           ;SET DO
1183  003244  000002                          RTI                     ;WE FOUND OUR FIRST BLOCK
1184  003246  012777  003262  175132  TCR2:   MOV     #TCR3,@TCIV     ;SET UP INTERRUPT TO TEST ALL BLOCKS
1185  003254  105277  175112                  INCB    @TCCM           ;SET DO
1186  003260  000002                          RTI                     ;WAIT FOR NEXT BLOCK TO INTERRUPT
1187
1188                                  ;FIND SEQUENTIAL BLOCK IN REVERSE DIRECTION
1189  003262  032777  100200  175102  TCR3:   BIT     #100200,@TCCM   ;TEST FOR READ AND ERROR
1190  003270  003001                          BGT     .+4
1191  003272  104000                          HLT                     ;ERROR READING SEQUENTIAL BLOCK IN REVERSE
```

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1192  003274  026777  177364  175074          CMP     TCEIRST,@TCDT   ;DID WE DO ALL THE BLOCKS
1193  003302  001666                          BEQ     XFENDZ          ;YES - GO TO END ZONE TO RESTART
1194  003304  005367  177362                  DEC     TCEXPE          ;NO - DECREMENT BLOCK NUMBER
1195  003310  027767  175062  177354          CMP     @TCDT,TCEXPE    ;TEST SEQUENTAIL BLOCK IN REVERSE
1196  003316  001401                          BEQ     .+4
1197  003320  104000                          HLT                     ;TEST SEQUENTIAL READ BLOCK IN REVERSE FAILED
1198  003322  000403                          BR      TCRBK           ;THIS ROUTINE READ A BLOCK
1199  003324  105277  175042          TCR4:   INCB    @TCCM           ;SET DO
1200  003330  000002                          RTI                     ;LETS TRY A NEW BLOCK
1201
1202                                  ;READ REVERSE ALL BLOCK EXCEPT BLOCK 1101
1203  003332  012777  003370  175046  TCRBK:  MOV     #TCRB1,@TCIV    ;SET UP INTERRUPT VECTOR
1204  003340  012777  177400  175034          MOV     #-400,@TCWC     ;READ ONE BLOCK
1205  003346  012777  003416  175030          MOV     #TCRBUF,@TCBA   ;WHERE BUFFER IS
1206  003354  112777  000505  175010          MOVB    #IE+RD+DO,@TCCM ;READ THE BLOCK
1207  003362  004767  175046                  JSR     %7,TC1          ;CHECK DATA BUFFER
1208  003366  000002                          RTI                     ;EXIT - RETURN WHEN BLOCK IS READ
1209  003370  005777  174776          TCRB1:  TST     @TCCM           ;AND ERRORS
1210  003374  100001                          BPL     .+4
1211  003376  104000                          HLT                     ;DECTAPE ERROR
1212  003400  012777  003262  175000          MOV     #TCR3,@TCIV     ;NEW VECTOR FOR BLOCK SEARCH
1213  003406  112777  000502  174756          MOVB    #IE+RB,@TCCM    ;READ BLOCK FUNCTION
1214  003414  000743                          BR      TCR4            ;RETURN TO BLOCK SEARCH
1215
1216                                  ;THIS WRITE BUFFER LOOK THE SAME FORWARD OR REVERSE
1217  003416                          TCWBUF:
1218  003416                          TCRBUF:
1219          000001                          N=1
1220          000100                          .REPT   100
1221                                          N                       ;DECTAPE READ/WRITE BUFFER
1222                                          -N
1223                                          N=N+1
1224                                          .ENDR
1225  003416  000001                          N                       ;DECTAPE READ/WRITE BUFFER
1226  003420  177777                          -N
1227          000002                          N=N+1
1228  003422  000002                          N                       ;DECTAPE READ/WRITE BUFFER
1229  003424  177776                          -N
1230          000003                          N=N+1
1231  003426  000003                          N                       ;DECTAPE READ/WRITE BUFFER
1232  003430  177775                          -N
1233          000004                          N=N+1
1234  003432  000004                          N                       ;DECTAPE READ/WRITE BUFFER
1235  003434  177774                          -N
1236          000005                          N=N+1
1237  003436  000005                          N                       ;DECTAPE READ/WRITE BUFFER
1238  003440  177773                          -N
1239          000006                          N=N+1
1240  003442  000006                          N                       ;DECTAPE READ/WRITE BUFFER
1241  003444  177772                          -N
1242          000007                          N=N+1
1243  003446  000007                          N                       ;DECTAPE READ/WRITE BUFFER
1244  003450  177771                          -N
1245          000010                          N=N+1
1246  003452  000010                          N                       ;DECTAPE READ/WRITE BUFFER
1247  003454  177770                          -N
```

```
1248            000011                  N=N+1
1249  003456    000011                  N               ;DECTAPE READ/WRITE BUFFER
1250  003460    177767                  -N
1251            000012                  N=N+1
1252  003462    000012                  N               ;DECTAPE READ/WRITE BUFFER
1253  003464    177766                  -N
1254            000013                  N=N+1
1255  003466    000013                  N               ;DECTAPE READ/WRITE BUFFER
1256  003470    177765                  -N
1257            000014                  N=N+1
1258  003472    000014                  N               ;DECTAPE READ/WRITE BUFFER
1259  003474    177764                  -N
1260            000015                  N=N+1
1261  003476    000015                  N               ;DECTAPE READ/WRITE BUFFER
1262  003500    177763                  -N
1263            000016                  N=N+1
1264  003502    000016                  N               ;DECTAPE READ/WRITE BUFFER
1265  003504    177762                  -N
1266            000017                  N=N+1
1267  003506    000017                  N               ;DECTAPE READ/WRITE BUFFER
1268  003510    177761                  -N
1269            000020                  N=N+1
1270  003512    000020                  N               ;DECTAPE READ/WRITE BUFFER
1271  003514    177760                  -N
1272            000021                  N=N+1
1273  003516    000021                  N               ;DECTAPE READ/WRITE BUFFER
1274  003520    177757                  -N
1275            000022                  N=N+1
1276  003522    000022                  N               ;DECTAPE READ/WRITE BUFFER
1277  003524    177756                  -N
1278            000023                  N=N+1
1279  003526    000023                  N               ;DECTAPE READ/WRITE BUFFER
1280  003530    177755                  -N
1281            000024                  N=N+1
1282  003532    000024                  N               ;DECTAPE READ/WRITE BUFFER
1283  003534    177754                  -N
1284            000025                  N=N+1
1285  003536    000025                  N               ;DECTAPE READ/WRITE BUFFER
1286  003540    177753                  -N
1287            000026                  N=N+1
1288  003542    000026                  N               ;DECTAPE READ/WRITE BUFFER
1289  003544    177752                  -N
1290            000027                  N=N+1
1291  003546    000027                  N               ;DECTAPE READ/WRITE BUFFER
1292  003550    177751                  -N
1293            000030                  N=N+1
1294  003552    000030                  N               ;DECTAPE READ/WRITE BUFFER
1295  003554    177750                  -N
1296            000031                  N=N+1
1297  003556    000031                  N               ;DECTAPE READ/WRITE BUFFER
1298  003560    177747                  -N
1299            000032                  N=N+1
1300  003562    000032                  N               ;DECTAPE READ/WRITE BUFFER
1301  003564    177746                  -N
1302            000033                  N=N+1
1303  003566    000033                  N               ;DECTAPE READ/WRITE BUFFER
```

```
1304  003570  177745          -N
1305          000034          N=N+1
1306  003572  000034          N                   ;DECTAPE READ/WRITE BUFFER
1307  003574  177744          -N
1308          000035          N=N+1
1309  003576  000035          N                   ;DECTAPE READ/WRITE BUFFER
1310  003600  177743          -N
1311          000036          N=N+1
1312  003602  000036          N                   ;DECTAPE READ/WRITE BUFFER
1313  003604  177742          -N
1314          000037          N=N+1
1315  003606  000037          N                   ;DECTAPE READ/WRITE BUFFER
1316  003610  177741          -N
1317          000040          N=N+1
1318  003612  000040          N                   ;DECTAPE READ/WRITE BUFFER
1319  003614  177740          -N
1320          000041          N=N+1
1321  003616  000041          N                   ;DECTAPE READ/WRITE BUFFER
1322  003620  177737          -N
1323          000042          N=N+1
1324  003622  000042          N                   ;DECTAPE READ/WRITE BUFFER
1325  003624  177736          -N
1326          000043          N=N+1
1327  003626  000043          N                   ;DECTAPE READ/WRITE BUFFER
1328  003630  177735          -N
1329          000044          N=N+1
1330  003632  000044          N                   ;DECTAPE READ/WRITE BUFFER
1331  003634  177734          -N
1332          000045          N=N+1
1333  003636  000045          N                   ;DECTAPE READ/WRITE BUFFER
1334  003640  177733          -N
1335          000046          N=N+1
1336  003642  000046          N                   ;DECTAPE READ/WRITE BUFFER
1337  003644  177732          -N
1338          000047          N=N+1
1339  003646  000047          N                   ;DECTAPE READ/WRITE BUFFER
1340  003650  177731          -N
1341          000050          N=N+1
1342  003652  000050          N                   ;DECTAPE READ/WRITE BUFFER
1343  003654  177730          -N
1344          000051          N=N+1
1345  003656  000051          N                   ;DECTAPE READ/WRITE BUFFER
1346  003660  177727          -N
1347          000052          N=N+1
1348  003662  000052          N                   ;DECTAPE READ/WRITE BUFFER
1349  003664  177726          -N
1350          000053          N=N+1
1351  003666  000053          N                   ;DECTAPE READ/WRITE BUFFER
1352  003670  177725          -N
1353          000054          N=N+1
1354  003672  000054          N                   ;DECTAPE READ/WRITE BUFFER
1355  003674  177724          -N
1356          000055          N=N+1
1357  003676  000055          N                   ;DECTAPE READ/WRITE BUFFER
1358  003700  177723          -N
1359          000056          N=N+1
```

```
003702  000056          N               ;DECTAPE READ/WRITE BUFFER
003704  177722          -N
        000057          N=N+1
003706  000057          N               ;DECTAPE READ/WRITE BUFFER
003710  177721          -N
        000060          N=N+1
003712  000060          N               ;DECTAPE READ/WRITE BUFFER
003714  177720          -N
        000061          N=N+1
003716  000061          N               ;DECTAPE READ/WRITE BUFFER
003720  177717          -N
        000062          N=N+1
003722  000062          N               ;DECTAPE READ/WRITE BUFFER
003724  177716          -N
        000063          N=N+1
003726  000063          N               ;DECTAPE READ/WRITE BUFFER
003730  177715          -N
        000064          N=N+1
003732  000064          N               ;DECTAPE READ/WRITE BUFFER
003734  177714          -N
        000065          N=N+1
003736  000065          N               ;DECTAPE READ/WRITE BUFFER
003740  177713          -N
        000066          N=N+1
003742  000066          N               ;DECTAPE READ/WRITE BUFFER
003744  177712          -N
        000067          N=N+1
003746  000067          N               ;DECTAPE READ/WRITE BUFFER
003750  177711          -N
        000070          N=N+1
003752  000070          N               ;DECTAPE READ/WRITE BUFFER
003754  177710          -N
        000071          N=N+1
003756  000071          N               ;DECTAPE READ/WRITE BUFFER
003760  177707          -N
        000072          N=N+1
003762  000072          N               ;DECTAPE READ/WRITE BUFFER
003764  177706          -N
        000073          N=N+1
003766  000073          N               ;DECTAPE READ/WRITE BUFFER
003770  177705          -N
        000074          N=N+1
003772  000074          N               ;DECTAPE READ/WRITE BUFFER
003774  177704          -N
        000075          N=N+1
003776  000075          N               ;DECTAPE READ/WRITE BUFFER
004000  177703          -N
        000076          N=N+1
004002  000076          N               ;DECTAPE READ/WRITE BUFFER
004004  177702          -N
        000077          N=N+1
004006  000077          N               ;DECTAPE READ/WRITE BUFFER
004010  177701          -N
        000100          N=N+1
004012  000100          N               ;DECTAPE READ/WRITE BUFFER
004014  177700          -N
```

```
1416            000101                          N=N+1
1417            000100                          .REPT   100
1418                                            N=N-1
1419                                            -N
1420                                            N               ;DEC TAPE READ/WRITE BUFFER
1421                                            .ENDR
1422            000100                          N=N-1
1423  004016    177700                          -N
1424  004020    000100                          N               ;DEC TAPE READ/WRITE BUFFER
1425            000077                          N=N-1
1426  004022    177701                          -N
1427  004024    000077                          N               ;DEC TAPE READ/WRITE BUFFER
1428            000076                          N=N-1
1429  004026    177702                          -N
1430  004030    000076                          N               ;DEC TAPE READ/WRITE BUFFER
1431            000075                          N=N-1
1432  004032    177703                          -N
1433  004034    000075                          N               ;DEC TAPE READ/WRITE BUFFER
1434            000074                          N=N-1
1435  004036    177704                          -N
1436  004040    000074                          N               ;DEC TAPE READ/WRITE BUFFER
1437            000073                          N=N-1
1438  004042    177705                          -N
1439  004044    000073                          N               ;DEC TAPE READ/WRITE BUFFER
1440            000072                          N=N-1
1441  004046    177706                          -N
1442  004050    000072                          N               ;DEC TAPE READ/WRITE BUFFER
1443            000071                          N=N-1
1444  004052    177707                          -N
1445  004054    000071                          N               ;DEC TAPE READ/WRITE BUFFER
1446            000070                          N=N-1
1447  004056    177710                          -N
1448  004060    000070                          N               ;DEC TAPE READ/WRITE BUFFER
1449            000067                          N=N-1
1450  004062    177711                          -N
1451  004064    000067                          N               ;DEC TAPE READ/WRITE BUFFER
1452            000066                          N=N-1
1453  004066    177712                          -N
1454  004070    000066                          N               ;DEC TAPE READ/WRITE BUFFER
1455            000065                          N=N-1
1456  004072    177713                          -N
1457  004074    000065                          N               ;DEC TAPE READ/WRITE BUFFER
1458            000064                          N=N-1
1459  004076    177714                          -N
1460  004100    000064                          N               ;DEC TAPE READ/WRITE BUFFER
1461            000063                          N=N-1
1462  004102    177715                          -N
1463  004104    000063                          N               ;DEC TAPE READ/WRITE BUFFER
1464            000062                          N=N-1
1465  004106    177716                          -N
1466  004110    000062                          N               ;DEC TAPE READ/WRITE BUFFER
1467            000061                          N=N-1
1468  004112    177717                          -N
1469  004114    000061                          N               ;DEC TAPE READ/WRITE BUFFER
1470            000060                          N=N-1
1471  004116    177720                          -N
```

```
004120  000060          N               ;DEC TAPE READ/WRITE BUFFER
        000057          N=N-1
004122  177721          -N
004124  000057          N               ;DEC TAPE READ/WRITE BUFFER
        000056          N=N-1
004126  177722          -N
004130  000056          N               ;DEC TAPE READ/WRITE BUFFER
        000055          N=N-1
004132  177723          -N
004134  000055          N               ;DEC TAPE READ/WRITE BUFFER
        000054          N=N-1
004136  177724          -N
004140  000054          N               ;DEC TAPE READ/WRITE BUFFER
        000053          N=N-1
004142  177725          -N
004144  000053          N               ;DEC TAPE READ/WRITE BUFFER
        000052          N=N-1
004146  177726          -N
004150  000052          N               ;DEC TAPE READ/WRITE BUFFER
        000051          N=N-1
004152  177727          -N
004154  000051          N               ;DEC TAPE READ/WRITE BUFFER
        000050          N=N-1
004156  177730          -N
004160  000050          N               ;DEC TAPE READ/WRITE BUFFER
        000047          N=N-1
004162  177731          -N
004164  000047          N               ;DEC TAPE READ/WRITE BUFFER
        000046          N=N-1
004166  177732          -N
004170  000046          N               ;DEC TAPE READ/WRITE BUFFER
        000045          N=N-1
004172  177733          -N
004174  000045          N               ;DEC TAPE READ/WRITE BUFFER
        000044          N=N-1
004176  177734          -N
004200  000044          N               ;DEC TAPE READ/WRITE BUFFER
        000043          N=N-1
004202  177735          -N
004204  000043          N               ;DEC TAPE READ/WRITE BUFFER
        000042          N=N-1
004206  177736          -N
004210  000042          N               ;DEC TAPE READ/WRITE BUFFER
        000041          N=N-1
004212  177737          -N
004214  000041          N               ;DEC TAPE READ/WRITE BUFFER
        000040          N=N-1
004216  177740          -N
004220  000040          N               ;DEC TAPE READ/WRITE BUFFER
        000037          N=N-1
004222  177741          -N
004224  000037          N               ;DEC TAPE READ/WRITE BUFFER
        000036          N=N-1
004226  177742          -N
004230  000036          N               ;DEC TAPE READ/WRITE BUFFER
        000035          N=N-1
```

```
004232  177743          -N
004234  000035          N               ;DEC TAPE READ/WRITE BUFFER
        000034          N=N-1
004236  177744          -N
004240  000034          N               ;DEC TAPE READ/WRITE BUFFER
        000033          N=N-1
004242  177745          -N
004244  000033          N               ;DEC TAPE READ/WRITE BUFFER
        000032          N=N-1
004246  177746          -N
004250  000032          N               ;DEC TAPE READ/WRITE BUFFER
        000031          N=N-1
004252  177747          -N
004254  000031          N               ;DEC TAPE READ/WRITE BUFFER
        000030          N=N-1
004256  177750          -N
004260  000030          N               ;DEC TAPE READ/WRITE BUFFER
        000027          N=N-1
004262  177751          -N
004264  000027          N               ;DEC TAPE READ/WRITE BUFFER
        000026          N=N-1
004266  177752          -N
004270  000026          N               ;DEC TAPE READ/WRITE BUFFER
        000025          N=N-1
004272  177753          -N
004274  000025          N               ;DEC TAPE READ/WRITE BUFFER
        000024          N=N-1
004276  177754          -N
004300  000024          N               ;DEC TAPE READ/WRITE BUFFER
        000023          N=N-1
004302  177755          -N
004304  000023          N               ;DEC TAPE READ/WRITE BUFFER
        000022          N=N-1
004306  177756          -N
004310  000022          N               ;DEC TAPE READ/WRITE BUFFER
        000021          N=N-1
004312  177757          -N
004314  000021          N               ;DEC TAPE READ/WRITE BUFFER
        000020          N=N-1
004316  177760          -N
004320  000020          N               ;DEC TAPE READ/WRITE BUFFER
        000017          N=N-1
004322  177761          -N
004324  000017          N               ;DEC TAPE READ/WRITE BUFFER
        000016          N=N-1
004326  177762          -N
004330  000016          N               ;DEC TAPE READ/WRITE BUFFER
        000015          N=N-1
004332  177763          -N
004334  000015          N               ;DEC TAPE READ/WRITE BUFFER
        000014          N=N-1
004336  177764          -N
004340  000014          N               ;DEC TAPE READ/WRITE BUFFER
        000013          N=N-1
004342  177765          -N
004344  000013          N               ;DEC TAPE READ/WRITE BUFFER
```

```
                000012                          N=N-1
004346          177766                          -N
004350          000012                          N               ;DEC TAPE READ/WRITE BUFFER
                000011                          N=N-1
004352          177767                          -N
004354          000011                          N               ;DEC TAPE READ/WRITE BUFFER
                000010                          N=N-1
004356          177770                          -N
004360          000010                          N               ;DEC TAPE READ/WRITE BUFFER
                000007                          N=N-1
004362          177771                          -N
004364          000007                          N               ;DEC TAPE READ/WRITE BUFFER
                000006                          N=N-1
004366          177772                          -N
004370          000006                          N               ;DEC TAPE READ/WRITE BUFFER
                000005                          N=N-1
004372          177773                          -N
004374          000005                          N               ;DEC TAPE READ/WRITE BUFFER
                000004                          N=N-1
004376          177774                          -N
004400          000004                          N               ;DEC TAPE READ/WRITE BUFFER
                000003                          N=N-1
004402          177775                          -N
004404          000003                          N               ;DEC TAPE READ/WRITE BUFFER
                000002                          N=N-1
004406          177776                          -N
004410          000002                          N               ;DEC TAPE READ/WRITE BUFFER
                000001                          N=N-1
004412          177777                          -N
004414          000001                          N               ;DEC TAPE READ/WRITE BUFFER

004416  012767  004416  012020  BEGIN:  MOV     #BEGIN,RETURN           ;FOR SCOPING
004424  104400                  SCOPE
004426  012737  004000  016440          MOV     #4000,@#ICOUNT          ;ITERATION COUNT
                        ;TEST COMPARE INSTRUCTION INDEXED
004434  012700  177770          MOV     #-10,%0                 ;MINUS 10 TO REG 0
004440  026027  016666  125252  CMP     A(0),#125252            ;(A INDEX BY MINUS 10) TO #125252
004446  001401                  BEQ     .+4
004450  104000                  HLT                             ;COMPARE WITH INDEX FAILED
004452  104400                  SCOPE

004454  022760  125252  016666  CMP     #125252,A(0)            ;A INDEXED
004462  001401                  BEQ     .+4
004464  104000                  HLT                             ;COMPARE FAILED DESTINATION INDEX
004466  104400                  SCOPE
                        ;SET "ISR" FOR DISKS AND KW11L TO CURRENT BANK
004470  010700                  MOV     %7,%0                   ;CURRENT BANK
004472  042700  007777          BIC     #007777,%0              ;LEAVE ONLY BANK BITS
004476  062700  002022          ADD     #LK3,%0                 ;ADD IN CLOCK ENTRANCE
004502  010037  000100          MOV     %0,@#100                ;LINE CLOCK, KW11L
004506  042700  007777          BIC     #007777,%0
004512  062700  002610          ADD     #IRF,%0
004516  010037  000204          MOV     %0,@#204                ;RF11 ISR
004522  042700  007777          BIC     #007777,%0
004526  062700  002512          ADD     #IRC,%0
004532  010037  000210          MOV     %0,@#210                ;RC11, ISR
```

```
1640  004536  042700  007777          BIC     #007777,%0
1641  004542  062700  002322          ADD     #IRK,%0
1642  004546  010037  000220          MOV     %0,@#220        ;RK11 ISR
1643  004552  042700  007777          BIC     #7777,%0
1644  004556  062700  002426          ADD     #IRP,%0
1645  004562  010037  000254          MOV     %0,@#254        ;RP11 ISR
1646  004566  042700  007777          BIC     #007777,%0
1647  004572  063700  002662          ADD     @#LLIMIT,%0
1648  004576  010067  176660          MOV     %0,LLIMIT       ;CHANGE DISK NPR BUFFER
1649  004602  042700  007777          BIC     #007777,%0
1650  004606  062700  016762          ADD     #BUFF,%0
1651  004612  010006                  MOV     %0,%6           ;CHANGE STACK TO EXISTING BANK
1652
1653  004614  012700  000010          MOV     #10,%0          ;INDEX
1654  004620  026027  016666  052525  CMP     A(0),#052525
1655  004626  001401                  BEQ     .+4
1656  004630  104000                  HLT                     ;COMPARE FAILED
1657  004632  104400                  SCOPE
1658
1659                                ;REGISTER 0 CONTAINS 000010
1660  004634  022760  052525  016666  CMP     #052525,A(0)
1661  004642  001401                  BEQ     .+4
1662  004644  104000                  HLT
1663  004646  104400                  SCOPE                   ;COMPARE FAILED
1664
1665                                ;REGISTER 0 CONTAINS 000010
1666  004650  026060  016666  016666  CMP     A(0),A(0)
1667  004656  001401                  BEQ     .+4
1668  004660  104000                  HLT
1669  004662  104400                  SCOPE                   ;COMPARE FAILED
1670
1671  004664  012700  177770          MOV     #-10,%0
1672  004670  026060  016666  016666  CMP     A(0),A(0)
1673  004676  001401                  BEQ     .+4
1674  004700  104000                  HLT
1675  004702  104400                  SCOPE                   ;COMPARE FAILED
1676
1677                                ;REGISTER 0 CONTAINS 177770 (-10)
1678  004704  012701  000004          MOV     #.+4,%1
1679  004710  026061  016666  016666  CMP     A(0),A(1)
1680  004716  001401                  BEQ     .+4
1681  004720  104000                  HLT
1682  004722  104400                  SCOPE                   ;COMPARE FAILED
1683
1684  004724  026160  016666  016666  CMP     A(1),A(0)
1685  004732  001401                  BEQ     .+4
1686  004734  104000                  HLT
1687  004736  104400                  SCOPE                   ;COMPARE FAILED
1688
1689  004740  012700  177774          MOV     #-4,%0
1690  004744  012701  000010          MOV     #.+10,%1
1691  004750  026061  016666  016666  CMP     A(0),A(1)
1692  004756  001401                  BEQ     .+4
1693  004760  104000                  HLT
1694  004762  104400                  SCOPE                   ;CMP FAILED
1695
                                    ;REGISTER 0 CONTAINS 177774 (-4)
```

```
                                                        ;REGISTER 1 CONTAINS 000010
004764  026160  016666  016666          CMP     A(1),A(0)
004772  001401                          BEQ     .+4
004774  104000                          HLT                     ;COMPARE FAILED
004776  104400                          SCOPE
                                ;TEST MOVE ODD BYTE TO REGISTER
                                ;PROBLEM 11S0237-7-MAR-72
005000  116700  011677                  MOVB    C+3,%0
005004  022700  000035                  CMP     #35,%0
005010  001401                          BEQ     .+4
005012  104000                          HLT
005014  104400                          SCOPE
                                ;TEST MOVE INSTRUCTION FOR INDEX
005016  012700  177770                  MOV     #-10,%0
005022  016067  016666  011660          MOV     A(0),TEMP
005030  026727  011654  125252          CMP     TEMP,#125252
005036  001401                          BEQ     .+4
005040  104000                          HLT                     ;COMPARE FAILED
005042  104400                          SCOPE

005044  012700  000010                  MOV     #+10,%0
005050  016067  016666  011632          MOV     A(0),TEMP
005056  026727  011626  052525          CMP     TEMP,#052525
005064  001401                          BEQ     .+4
005066  104000                          HLT                     ;MOV FAILED
005070  104400                          SCOPE

005072  012700  177770                  MOV     #-10,%0
005076  012760  125252  016710          MOV     #125252,TEMP(0)
005104  023727  016700  125252          CMP     @#C,#125252
005112  001401                          BEQ     .+4
005114  104000                          HLT                     ;MOV FAILED
005116  104400                          SCOPE

005120  012700  000010                  MOV     #+10,%0
005124  012760  052525  016710          MOV     #052525,TEMP(0)
005132  023727  016720  052525          CMP     @#TEMP+10,#052525
005140  001401                          BEQ     .+4
005142  104000                          HLT                     ;MOV FAILED
005144  104400                          SCOPE

                                ;TEST BIC INSTRUCTION FOR INDEXING
005146  012767  177777  011534          MOV     #-1,TEMP
005154  012700  177770                  MOV     #-10,%0
005160  046067  016666  011522          BIC     A(0),TEMP
005166  026727  011516  052525          CMP     TEMP,#052525
005174  001401                          BEQ     .+4
005176  104000                          HLT                     ;BIC FAILED
005200  104400                          SCOPE

005202  012767  177777  011500          MOV     #-1,TEMP
005210  012700  000010                  MOV     #10,%0
005214  046067  016666  011466          BIC     A(0),TEMP
005222  026727  011462  125252          CMP     TEMP,#125252
005230  001401                          BEQ     .+4
```

```
1752  005232  104000                        HLT                             ;BIC FAILED
1753  005234  104400                        SCOPE
1754
1755  005236  012737  177777  016720        MOV     #-1,@#TEMP+10
1756  005244  012700  000010                MOV     #10,%0
1757  005250  042760  125252  016710        BIC     #125252,TEMP(0)
1758  005256  023727  016720  052525        CMP     @#TEMP+10,#52525
1759  005264  001401                        BEQ     .+4
1760  005266  104000                        HLT                             ;BIC FAILED
1761  005270  104400                        SCOPE
1762
1763  005272  012700  177770                MOV     #-10,%0
1764  005276  012767  177777  011374        MOV     #-1,TEMP-10
1765  005304  042767  052525  011366        BIC     #052525,TEMP-10
1766  005312  026727  011362  125252        CMP     TEMP-10,#125252
1767  005320  001401                        BEQ     .+4
1768  005322  104000                        HLT                             ;BIC FAILED
1769  005324  104400                        SCOPE
1770                        ;TEST SUBTRACT INSTRUCTION FOR INDEXING
1771  005326  012767  125252  011354        MOV     #125252,TEMP
1772  005334  012700  177770                MOV     #-10,%0
1773  005340  166067  016666  011342        SUB     A(0),TEMP
1774  005346  001401                        BEQ     .+4
1775  005350  104000                        HLT                             ;SUB FAILED
1776  005352  104400                        SCOPE
1777
1778  005354  012737  125252  016710        MOV     #125252,@#TEMP
1779  005362  012700  177770                MOV     #-10,%0
1780  005366  166760  011264  016720        SUB     B,TEMP+10(0)
1781  005374  001401                        BEQ     .+4
1782  005376  104000                        HLT                             ;SUB FAILED
1783  005400  104400                        SCOPE
1784
1785  005402  012767  052525  011300        MOV     #052525,TEMP
1786  005410  012700  000010                MOV     #10,%0
1787  005414  166067  016666  011266        SUB     A(0),TEMP
1788  005422  001401                        BEQ     .+4
1789  005424  104000                        HLT                             ;SUB FAILED
1790  005426  104400                        SCOPE
1791
1792  005430  012737  052525  016710        MOV     #052525,@#TEMP
1793  005436  012700  000010                MOV     #10,%0
1794  005442  166760  011230  016700        SUB     A+10,C(0)
1795  005450  001401                        BEQ     .+4
1796  005452  104000                        HLT                             ;SUB FAILED
1797  005454  104400                        SCOPE
1798
1799                        ;TEST UNARYS INDEXED
1800  005456  012737  177777  016710        MOV     #-1,@#TEMP
1801  005464  012700  177770                MOV     #-10,%0
1802  005470  005060  016720                CLR     D(0)
1803  005474  005737  016710                TST     @#TEMP
1804  005500  001401                        BEQ     .+4
1805  005502  104000                        HLT                             ;CLR FAILED
1806  005504  104400                        SCOPE
1807
```

```
 1808  005506  012737  177777  016710          MOV     #-1,@#TEMP
 1809  005514  012700  000010                  MOV     #+10.,%0
 1810  005520  005060  016700                  CLR     C(0)
 1811  005524  005737  016710                  TST     @#TEMP
 1812  005530  001401                          BEQ     .+4
 1813  005532  104000                          HLT                             ;CLR FAILED
 1814  005534  104400                          SCOPE
 1815
 1816  005536  012737  177777  016710          MOV     #-1,@#TEMP
 1817  005544  012700  177770                  MOV     #-10.,%0
 1818  005550  005160  016720                  COM     D(0)
 1819  005554  005737  016710                  TST     @#TEMP
 1820  005560  001401                          BEQ     .+4
 1821  005562  104000                          HLT                             ;COM FAILED
 1822  005564  104400                          SCOPE
 1823
 1824  005566  012737  177777  016710          MOV     #-1,@#TEMP
 1825  005574  012700  000010                  MOV     #10.,%0
 1826  005600  005160  016700                  COM     C(0)
 1827  005604  005737  016710                  TST     @#TEMP
 1828  005610  001401                          BEQ     .+4
 1829  005612  104000                          HLT                             ;COM FAILED
 1830  005614  104400                          SCOPE
 1831  005616  012737  177777  016710          MOV     #-1,@#TEMP
 1832  005624  012700  177770                  MOV     #-10.,%0
 1833  005630  005260  016720                  INC     D(0)
 1834  005634  005737  016710                  TST     @#TEMP
 1835  005640  001401                          BEQ     .+4
 1836  005642  104000                          HLT                             ;INC FAILED
 1837  005644  104400                          SCOPE
 1838
 1839  005646  012737  177777  016710          MOV     #-1,@#TEMP
 1840  005654  012700  000010                  MOV     #+10.,%0
 1841  005660  005260  016700                  INC     C(0)
 1842  005664  005737  016710                  TST     @#TEMP
 1843  005670  001401                          BEQ     .+4
 1844  005672  104000                          HLT                             ;INC FAILED
 1845  005674  104400                          SCOPE
 1846
 1847  005676  012737  000001  016710          MOV     #1,@#TEMP
 1848  005704  012700  177770                  MOV     #-10.,%0
 1849  005710  005360  016720                  DEC     D(0)
 1850  005714  005737  016710                  TST     @#TEMP
 1851  005720  001401                          BEQ     .+4
 1852  005722  104000                          HLT                             ;DEC FAILED
 1853  005724  104400                          SCOPE
 1854
 1855  005726  012737  000001  016710          MOV     #1,@#TEMP
 1856  005734  012700  000010                  MOV     #10.,%0
 1857  005740  005360  016700                  DEC     C(0)
 1858  005744  005737  016710                  TST     @#TEMP
 1859  005750  001401                          BEQ     .+4
 1860  005752  104000                          HLT                             ;DEC FAILED
 1861  005754  104400                          SCOPE
 1862
 1863  005756  012737  000001  016710          MOV     #1,@#TEMP
```

```
1864  005764  012700  177770          MOV     #-10,%0
1865  005770  005460  016720          NEG     D(0)
1866  005774  022737  177777  016710  CMP     #-1,@#TEMP
1867  006002  001401                  BEQ     .+4
1868  006004  104000                  HLT                     ;NEG FAILED
1869  006006  104400                  SCOPE
1870
1871  006010  012737  000001  016710  MOV     #1,@#TEMP
1872  006016  012700  000010          MOV     #+10,%0
1873  006022  005460  016700          NEG     C(0)
1874  006026  022737  177777  016710  CMP     #-1,@#TEMP
1875  006034  001401                  BEQ     .+4
1876  006036  104000                  HLT                     ;NEG FAILED
1877  006040  104400                  SCOPE
1878
1879  006042  012737  177777  016710  MOV     #-1,@#TEMP
1880  006050  012700  177770          MOV     #-10,%0
1881  006054  000261                  SEC
1882  006056  005560  016720          ADC     D(0)
1883  006062  005737  016710          TST     @#TEMP
1884  006066  001401                  BEQ     .+4
1885  006070  104000                  HLT                     ;ADC FAILED
1886  006072  104400                  SCOPE
1887
1888  006074  012737  177777  016710  MOV     #-1,@#TEMP
1889  006102  012700  000010          MOV     #+10,%0
1890  006106  000261                  SEC
1891  006110  005560  016700          ADC     C(0)
1892  006114  005737  016710          TST     @#TEMP
1893  006120  001401                  BEQ     .+4
1894  006122  104000                  HLT                     ;ADC FAILED
1895  006124  104400                  SCOPE
1896
1897  006126  012737  000001  016710  MOV     #1,@#TEMP
1898  006134  012700  177770          MOV     #-10,%0
1899  006140  000261                  SEC
1900  006142  005660  016720          SBC     D(0)
1901  006146  005737  016710          TST     @#TEMP
1902  006152  001401                  BEQ     .+4
1903  006154  104000                  HLT                     ;SBC FAILED
1904  006156  104400                  SCOPE
1905
1906  006160  012737  000001  016710  MOV     #1,@#TEMP
1907  006166  012700  000010          MOV     #+10,%0
1908  006172  000261                  SEC
1909  006174  005660  016700          SBC     C(0)
1910  006200  005737  016710          TST     @#TEMP
1911  006204  001401                  BEQ     .+4
1912  006206  104000                  HLT                     ;SBC FAILED
1913  006210  104400                  SCOPE
1914
1915                          ;TEST JMP INDIRECT
1916  006212  01070C                  MOV     %7,%0
1917  006214  062700  000010          ADD     #10,%0
1918  006220  000110                  JMP     @%0
1919  006222  104000                  HLT                     ;JMP FAILED
```

```
1920  006224  000240                          NOP
1921  006226  104400                          SCOPE
1922
1923
1923  006230  010600                          MOV     %6,%0
1924  006232  010001                          MOV     %0,%1
1925  006234  010102                          MOV     %1,%2
1926  006236  010203                          MOV     %2,%3
1927  006240  010304                          MOV     %3,%4
1928  006242  010405                          MOV     %4,%5
1929  006244  020605                          CMP     %6,%5
1930  006246  001401                          BEQ     .+4
1931  006250  104000                          HLT                     ;MOV REGISTOR FAILED
1932  006252  104400                          SCOPE
1933                                ;TEST INDIRECT ADDRESSING
1934                                ;TEST COMPARE INSTRUCTION
1935  006254  023727  016656  125252          CMP     @#8,#125252
1936  006262  001401                          BEQ     .+4
1937  006264  104000                          HLT                     ;CMP FAILED
1938  006266  104400                          SCOPE
1939
1940  006270  022737  125252  016656          CMP     #125252,@#8
1941  006276  001401                          BEQ     .+4
1942  006300  104000                          HLT                     ;CMP FAILED
1943  006302  104400                          SCOPE
1944
1945  006304  023737  016656  016656          CMP     @#8,@#8
1946  006312  001401                          BEQ     .+4
1947  006314  104000                          HLT                     ;CMP FAILED
1948  006316  104400                          SCOPE
1949
1950                                ;TEST MOVE INSTRUCTIONS
1951  006320  013700  016656                  MOV     @#8,%0
1952  006324  022700  125252                  CMP     #125252,%0
```

```
 1953  006330  001401                          BEQ     .+4
 1954  006332  104000                          HLT                             ;MOV FAILED
 1955  006334  104400                          SCOPE
 1956
 1957  006336  012737  125252  016710          MOV     #125252,@#TEMP
 1958  006344  023737  016656  016710          CMP     @#B,@#TEMP
 1959  006352  001401                          BEQ     .+4
 1960  006354  104000                          HLT                             ;MOV FAILED
 1961  006356  104400                          SCOPE
 1962
 1963  006360  013737  016656  016700          MOV     @#B,@#C
 1964  006366  023737  016656  016700          CMP     @#B,@#C
 1965  006374  001401                          BEQ     .+4
 1966  006376  104000                          HLT                             ;MOV FAILED
 1967  006400  104400                          SCOPE
 1968                          ;TEST BIC INSTRUCTION INDIRECT
 1969  006402  012700  177777                  MOV     #-1,%0
 1970  006406  043700  016656                  BIC     @#B,%0
 1971  006412  020027  052525                  CMP     %0,#052525
 1972  006416  001401                          BEQ     .+4
 1973  006420  104000                          HLT                             ;BIC FAILED
 1974  006422  104400                          SCOPE
 1975
 1976  006424  012737  177777  016710          MOV     #-1,@#TEMP
 1977  006432  042737  125252  016710          BIC     #125252,@#TEMP
 1978  006440  022737  052525  016710          CMP     #052525,@#TEMP
 1979  006446  001401                          BEQ     .+4
 1980  006450  104000                          HLT                             ;BIC FAILED
 1981  006452  104400                          SCOPE
 1982
 1983  006454  012737  177777  016700          MOV     #-1,@#C
 1984  006462  043737  016656  016700          BIC     @#B,@#C
 1985  006470  023727  016700  052525          CMP     @#C,#52525
 1986  006476  001401                          BEQ     .+4
 1987  006500  104000                          HLT                             ;BIC FAILED
 1988  006502  104400                          SCOPE
 1989
 1990                          ;TEST SUBTRACT INSTRUCTION
 1991  006504  012700  125252                  MOV     #125252,%0
 1992  006510  163700  016656                  SUB     @#B,%0
 1993  006514  020027  000000                  CMP     %0,#0
 1994  006520  001401                          BEQ     .+4
 1995  006522  104000                          HLT                             ;SUB FAILED
 1996  006524  104400                          SCOPE
 1997
 1998  006526  012737  125252  016710          MOV     #125252,@#TEMP
 1999  006534  166737  010116  016710          SUB     B,@#TEMP
 2000  006542  001401                          BEQ     .+4
 2001  006544  104000                          HLT                             ;SUB FAILED
 2002  006546  104400                          SCOPE
 2003
 2004  006550  012767  125252  010132          MOV     #125252,TEMP
 2005  006556  163767  016656  010124          SUB     @#B,TEMP
 2006  006564  005767  010120                  TST     TEMP
 2007  006570  001401                          BEQ     .+4
 2008  006572  104000                          HLT                             ;SUB FAILED
```

```
2009  006574  104400                          SCOPE
2010                              ;TEST UNARYS INDIRECT
2011  006576  012737  177777  016710          MOV     #-1,@#TEMP
2012  006604  005037  016710                  CLR     @#TEMP
2013  006610  005737  016710                  TST     @#TEMP
2014  006614  001401                          BEQ     .+4
2015  006616  104000                          HLT                             ;TST FAILED
2016  006620  104400                          SCOPE
2017
2018  006622  012737  125252  016710          MOV     #125252,@#TEMP
2019  006630  005137  016710                  COM     @#TEMP
2020  006634  022737  052525  016710          CMP     #052525,@#TEMP
2021  006642  001401                          BEQ     .+4
2022  006644  104000                          HLT                             ;COM FAILED
2023  006646  104400                          SCOPE
2024
2025  006650  005037  016710                  CLR     @#TEMP
2026  006654  005237  016710                  INC     @#TEMP
2027  006660  022737  000001  016710          CMP     #1,@#TEMP
2028  006666  001401                          BEQ     .+4
2029  006670  104000                          HLT                             ;INC FAILED
2030  006672  104400                          SCOPE
2031
2032  006674  005037  016710                  CLR     @#TEMP
2033  006700  005377  010006                  DEC     @TEMP+2
2034  006704  023727  016710  177777          CMP     @#TEMP,#-1
2035  006712  001401                          BEQ     .+4
2036  006714  104000                          HLT                             ;DEC FAILED
2037  006716  104400                          SCOPE
2038
2039  006720  012737  000001  016710          MOV     #1,@#TEMP
2040  006726  005437  016710                  NEG     @#TEMP
2041  006732  022737  177777  016710          CMP     #-1,@#TEMP
2042  006740  001401                          BEQ     .+4
2043  006742  104000                          HLT                             ;NEG FAILED
2044  006744  104400                          SCOPE
2045
2046                              ;TEST INDIRECT ADDRESSING WITH INDEXING
2047                              ;TEST COMPARE INSTRUCTION
2048  006746  027727  007706  125252          CMP     @B+2,#125252
2049  006754  001401                          BEQ     .+4
2050  006756  104000                          HLT                             ;CMP FAILED
2051  006760  104400                          SCOPE
2052
2053  006762  022777  125252  007670          CMP     #125252,@B+2
2054  006770  001401                          BEQ     .+4
2055  006772  104000                          HLT                             ;CMP FAILED
2056  006774  104400                          SCOPE
2057
2058  006776  027777  007656  007654          CMP     @B+2,@B+2
2059  007004  001401                          BEQ     .+4
2060  007006  104000                          HLT                             ;CMP FAILED
2061  007010  104400                          SCOPE
2062
2063                              ;TEST MOVE INSTRUCTIONS
2064  007012  017700  007642                  MOV     @B+2,%0
```

```
2065  007016  022700  125252          CMP     #125252,%0
2066  007022  001401                  BEQ     .+4
2067  007024  104000                  HLT                             ;MOV FAILED
2068  007026  104400                  SCOPE
2069
2070  007030  012777  125252  007654  MOV     #125252,@TEMP+2
2071  007036  023737  016656  016710  CMP     @#B,@#TEMP
2072  007044  001401                  BEQ     .+4
2073  007046  104000                  HLT                             ;MOV FAILED
2074  007050  104400                  SCOPE
2075
2076  007052  017777  007602  007622  MOV     @B+2,@C+2
2077  007060  023737  016656  016700  CMP     @#B,@#C
2078  007066  001401                  BEQ     .+4
2079  007070  104000                  HLT
2080  007072  104400                  SCOPE
2081
2082                          ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2083  007074  012700  177777          MOV     #-1,%0
2084  007100  047700  007554          BIC     @B+2,%0
2085  007104  020027  052525          CMP     %0,#52525
2086  007110  001401                  BEQ     .+4
2087  007112  104000                  HLT                             ;BIC FAILED
2088  007114  104400                  SCOPE
2089
2090  007116  012737  177777  016710  MOV     #-1,@#TEMP
2091  007124  042777  125252  007560  BIC     #125252,@TEMP+2
2092  007132  022737  052525  016710  CMP     #52525,@#TEMP
2093  007140  001401                  BEQ     .+4
2094  007142  104000                  HLT                             ;BIC FAILED
2095  007144  104400                  SCOPE
2096
2097  007146  012737  177777  016700  MOV     #-1,@#C
2098  007154  047777  007500  007520  BIC     @B+2,@C+2
2099  007162  026737  007510  016700  CMP     A+10,@#C
2100  007170  001401                  BEQ     .+4
2101  007172  104000                  HLT                             ;BIC FAILED
2102  007174  104400                  SCOPE
2103
2104  007176  012700  125252          MOV     #125252,%0
2105  007202  167700  007452          SUB     @B+2,%0
2106  007206  020027  000000          CMP     %0,#0
2107  007212  001401                  BEQ     .+4
2108  007214  104000                  HLT                             ;SUB FAILED
2109  007216  104400                  SCOPE
2110
2111  007220  012737  125252  016710  MOV     #125252,@#TEMP
2112  007226  166777  007424  007456  SUB     B,@TEMP+2
2113  007234  001401                  BEQ     .+4
2114  007236  104000                  HLT                             ;SUB FAILED
2115  007240  104400                  SCOPE
2116
2117  007242  012737  125252  016710  MOV     #125252,@#TEMP
2118  007250  167777  007404  007434  SUB     @B+2,@TEMP+2
2119  007256  005737  016710          TST     @#TEMP
2120  007262  001401                  BEQ     .+4
```

```
2121  007264  104000                        HLT                             ;SUB FAILED
2122  007266  104400                        SCOPE
2123
2124                                  ;TEST ADD INDIRECT WITH INDEXING
2125  007270  005000                        CLR     %0
2126  007272  062700  007362                ADD     @#.+2,%0
2127  007276  027700  125252                CMP     #125252,%0
2128  007302  001401                        BEQ     .+4
2129  007304  104000                        HLT                             ;ADD FAILED
2130  007306  104400                        SCOPE
2131
2132  007310  005037  016710                CLR     @#TEMP
2133  007314  062777  125252  007370        ADD     #125252,TEMP+2
2134  007322  027737  125252  016710        CMP     #125252,@#TEMP
2135  007330  001401                        BEQ     .+4
2136  007332  104000                        HLT                             ;ADD FAILED
2137  007334  104400                        SCOPE
2138  007336  012737  125252  016710        MOV     #125252,@#TEMP
2139  007344  062777  007324  007340        ADD     @#A+6,TEMP+2
2140  007352  023727  016710  177777        CMP     @#TEMP,#-1
2141  007360  001401                        BEQ     .+4
2142  007362  104000                        HLT                             ;ADD FAILED
2143  007364  104400                        SCOPE
2144
2145                                  ;TEST UNARYS INDIRECT WITH INDEXING
2146  007366  012737  177777  016710        MOV     #-1,@#TEMP
2147  007374  005077  007312                CLR     @TEMP+2
2148  007400  005737  016710                TST     @#TEMP
2149  007404  001401                        BEQ     .+4
2150  007406  104000                        HLT                             ;TST FAILED
2151  007410  104400                        SCOPE
2152
2153  007412  012737  125252  016710        MOV     #125252,@#TEMP
2154  007420  005177  007266                COM     @TEMP+2
2155  007424  022737  052525  016710        CMP     #052525,@#TEMP
2156  007432  001401                        BEQ     .+4
2157  007434  104000                        HLT                             ;COM FAILED
2158  007436  104400                        SCOPE
2159
2160  007440  005037  016710                CLR     @#TEMP
2161  007444  005277  007242                INC     @TEMP+2
2162  007450  022737  000001  016710        CMP     #1,@#TEMP
2163  007456  001401                        BEQ     .+4
2164  007460  104000                        HLT                             ;INC FAILED
2165  007462  104400                        SCOPE
2166
2167  007464  005037  016710                CLR     @#TEMP
2168  007470  005377  007216                DEC     @TEMP+2
2169  007474  023727  016710  177777        CMP     @#TEMP,#-1
2170  007502  001401                        BEQ     .+4
2171  007504  104000                        HLT                             ;DEC FAILED
2172  007506  104400                        SCOPE
2173
2174  007510  012737  000001  016710        MOV     #1,@#TEMP
2175  007516  005477  007170                NEG     @TEMP+2
2176  007522  022737  177777  016710        CMP     #-1,@#TEMP
```

```
 2177  007530  001401                          BEQ     .+4
 2178  007532  104000                          HLT                             ;NEG FAILED
 2179  007534  104400                          SCOPE
 2180
 2181  007536  012737  177777  016710          MOV     #-1,@#TEMP
 2182  007544  000261                          SEC
 2183  007546  005577  007140                  ADC     @TEMP+2
 2184  007552  005737  016710                  TST     @#TEMP
 2185  007556  001401                          BEQ     .+4
 2186  007560  104000                          HLT                             ;ADC FAILED
 2187  007562  104400                          SCOPE
 2188
 2189  007564  012737  000001  016710          MOV     #1,@#TEMP
 2190  007572  000261                          SEC
 2191  007574  005577  007112                  SBC     @TEMP+2
 2192  007600  005737  016710                  TST     @#TEMP
 2193  007604  001401                          BEQ     .+4
 2194  007606  104000                          HLT                             ;SBC FAILED
 2195  007610  104400                          SCOPE
 2196
 2197                                  ;TEST OF COMBINED INDEXING AND INDIRECT
 2198  007612  012700  177772                  MOV     #-6,%0
 2199  007616  027027  016666  125252          CMP     @A(0),#125252
 2200  007624  001401                          BEQ     .+4
 2201  007626  104000                          HLT                             ;CMP FAILED
 2202  007630  104400                          SCOPE
 2203
 2204  007632  012700  177772                  MOV     #-6,%0
 2205  007636  022770  125252  016666          CMP     #125252,@A(0)
 2206  007644  001401                          BEQ     .+4
 2207  007646  104000                          HLT                             ;CMP FAILED
 2208  007650  104400                          SCOPE
 2209
 2210  007652  012700  177772                  MOV     #-6,%0
 2211  007656  012701  000002                  MOV     #+2,%1
 2212  007662  027071  016666  016666          CMP     @A(0),@A(1)
 2213  007670  001401                          BEQ     .+4
 2214  007672  104000                          HLT                             ;CMP FAILED
 2215  007674  104400                          SCOPE
 2216
 2217                                  ;TEST BIC INSTRUCTION
 2218  007676  012700  000006                  MOV     #+6,%0
 2219  007702  012767  177777  007000          MOV     #-1,TEMP
 2220  007710  047067  016666  006772          BIC     @A(0),TEMP
 2221  007716  022767  125252  006764          CMP     #125252,TEMP
 2222  007724  001401                          BEQ     .+4
 2223  007726  104000                          HLT                             ;BIC FAILED
 2224  007730  104400                          SCOPE
 2225
 2226  007732  012700  177772                  MOV     #-6,%0
 2227  007736  012737  177777  016700          MOV     #-1,@#C
 2228  007744  042770  125252  016710          BIC     #125252,@TEMP(0)
 2229  007752  023727  016700  052525          CMP     @#C,#052525
 2230  007760  001401                          BEQ     .+4
 2231  007762  104000                          HLT                             ;BIC FAILED
 2232  007764  104400                          SCOPE
```

```
 2233  007766  012737  177777  016700          MOV     #-1,@#C
 2234  007774  012700  177772                  MOV     #-6,%0
 2235  010000  012701  177772                  MOV     #-6,%1
 2236  010004  040071  016666  016710          BIC     @A(0),@TEMP(1)
 2237  010012  022737  052525  016700          CMP     #052525,@#C
 2238  010020  001401                          BEQ     .+4
 2239  010022  104000                          HLT                             ;BIC FAILED
 2240  010024  104400                          SCOPE
 2241
 2242  010026  122727  000000  000001          CMPB    #0,#1           ;T7 FIX
 2243  010034  002401                          BLT     .+4
 2244  010036  104000                          HLT                     ;CMPB FAILED
 2245  010040  104400                          SCOPE
 2246                          ;TEST COMPARE INSTRUCTION INDEXED
 2247  010042  012700  177770                  MOV     #-10,%0                 ;MINUS 10 TO REG 0
 2248  010046  126027  016666  000252          CMPB    A(0),#000252            ;(A INDEX BY MINUS 10) TO #125252
 2249  010054  001401                          BEQ     .+4
 2250  010056  104000                          HLT                             ;COMPARE WITH INDEX FAILED
 2251  010060  104400                          SCOPE
 2252
 2253  010062  012700  177770                  MOV     #-10,%0                 ;FOR INDEX
 2254  010066  122760  000252  016666          CMPB    #000252,A(0)            ;A INDEXED
 2255  010074  001401                          BEQ     .+4
 2256  010076  104000                          HLT                             ;CMPB FAILED
 2257  010100  104400                          SCOPE
 2258
 2259  010102  012700  000010                  MOV     #10,%0                  ;INDEX
 2260  010106  126027  016666  000125          CMPB    A(0),#000125
 2261  010114  001401                          BEQ     .+4
 2262  010116  104000                          HLT                             ;CMPB FAILED
 2263  010120  104400                          SCOPE
 2264
 2265  010122  012700  000010                  MOV     #10,%0
 2266  010126  122760  000125  016666          CMPB    #000125,A(0)
 2267  010134  001401                          BEQ     .+4
 2268  010136  104000                          HLT                             ;CMPB FAILED
 2269  010140  104400                          SCOPE
 2270
 2271  010142  012700  177770                  MOV     #-10,%0
 2272  010146  126060  016666  016666          CMPB    A(0),A(0)
 2273  010154  001401                          BEQ     .+4
 2274  010156  104000                          HLT                             ;CMPB FAILED
 2275  010160  104400                          SCOPE
 2276
 2277  010162  012700  000010                  MOV     #+10,%0
 2278  010166  126060  016666  016666          CMPB    A(0),A(0)
 2279  010174  001401                          BEQ     .+4
 2280  010176  104000                          HLT                             ;CMPB FAILED
 2281  010200  104400                          SCOPE
 2282
 2283  010202  012700  177770                  MOV     #-10,%0
 2284  010206  012701  000004                  MOV     #+4,%1
 2285  010212  126061  016666  016666          CMPB    A(0),A(1)
 2286  010220  001401                          BEQ     .+4
 2287  010222  104000                          HLT                             ;CMPB FAILED
 2288  010224  104400                          SCOPE
```

```
2289
2290  010226  126160  016666  016666          CMPB    A(1),A(0)
2291  010234  001401                          BEQ     .+4
2292  010236  104000                          HLT                             ;CMPB FAILED
2293  010240  104400                          SCOPE
2294
2295  010242  012700  177774                  MOV     #-4,%0
2296  010246  012701  000010                  MOV     #+10,%1
2297  010252  126061  016666  016666          CMPB    A(0),A(1)
2298  010260  001401                          BEQ     .+4
2299  010262  104000                          HLT                             ;CMPB FAILED
2300  010264  104400                          SCOPE
2301
2302  010266  012700  177774                  MOV     #-4,%0
2303  010272  012701  000010                  MOV     #10,%1
2304  010276  126160  016666  016666          CMPB    A(1),A(0)
2305  010304  001401                          BEQ     .+4
2306  010306  104000                          HLT                             ;CMPB FAILED
2307  010310  104400                          SCOPE
2308                                ;TEST MOVE INSTRUCTION FOR INDEX
2309
2310  010312  012700  177770                  MOV     #-10,%0
2311  010316  116067  016666  006364          MOVB    A(0),TEMP
2312  010324  126727  006360  000252          CMPB    TEMP,#000252
2313  010332  001401                          BEQ     .+4
2314  010334  104000                          HLT                             ;MOVB FAILED
2315  010336  104400                          SCOPE
2316
2317  010340  012700  000010                  MOV     #+10,%0
2318  010344  116067  016666  006336          MOVB    A(0),TEMP
2319  010352  126727  006332  000125          CMPB    TEMP,#000125
2320  010360  001401                          BEQ     .+4
2321  010362  104000                          HLT                             ;MOVB FAILED
2322  010364  104400                          SCOPE
2323
2324  010366  012700  177770                  MOV     #-10,%0
2325  010372  112760  125252  016710          MOVB    #125252,TEMP(0)
2326  010400  123727  016700  125252          CMPB    @#C,#125252
2327  010406  001401                          BEQ     .+4
2328  010410  104000                          HLT                             ;MOVB FAILED
2329  010412  104400                          SCOPE
2330
2331  010414  012700  000010                  MOV     #+10,%0
2332  010420  112760  052525  016710          MOVB    #052525,TEMP(0)
2333  010426  123727  016720  052525          CMPB    @#TEMP+10,#052525
2334  010434  001401                          BEQ     .+4
2335  010436  104000                          HLT                             ;MOVB FAILED
2336  010440  104400                          SCOPE
2337
2338                                ;TEST BIC INSTRUCTION FOR INDEXING
2339  010442  012767  177777  006240          MOV     #-1,TEMP
2340  010450  012700  177770                  MOV     #-10,%0
2341  010454  146067  016666  006226          BICB    A(0),TEMP
2342  010462  126727  006222  177525          CMPB    TEMP,#177525
2343  010470  001401                          BEQ     .+4
2344  010472  104000                          HLT                             ;BICB FAILED
```

F04


```
       010474  104400                                  SCOPE

       010476  012767  177777  006204                  MOV     #-1,TEMP
       010504  012700  000010                          MOV     #10,%0
       010510  146067  016666  006172                  BICB    B(0),TEMP
       010516  126727  006166  007652                  CMPB    TEMP,#007652
       010524  001401                                  BEQ     .+4
       010526  104000                                  HLT                             ;BICB FAILED
       010530  104400                                  SCOPE

       010532  012737  177777  016720                  MOV     #-1,@#TEMP+10
       010540  012700  000010                          MOV     #10,%0
       010544  142760  125252  016710                  BICB    #125252,TEMP(0)
       010552  123727  016720  002525                  CMPB    @#TEMP+10,#2525
       010560  001401                                  BEQ     .+4
       010562  104000                                  HLT                             ;BICB FAILED
       010564  104400                                  SCOPE

       010566  012700  177770                          MOV     #-10,%0
       010572  012767  177777  006100                  MOV     #-1,TEMP-10
       010600  142767  052525  006072                  BICB    #052525,TEMP-10
       010606  126727  006066  125252                  CMPB    TEMP-10,#125252
       010614  001401                                  BEQ     .+4
       010616  104000                                  HLT                             ;BICB FAILED
       010620  104400                                  SCOPE

                                               ;TEST UNARYS INDEXED
       010622  012737  177777  016710                  MOV     #-1,@#TEMP
       010630  012700  177770                          MOV     #-10,%0
       010634  105060  016720                          CLRB    D(0)
       010640  105737  016710                          TSTB    @#TEMP
       010644  001401                                  BEQ     .+4
       010646  104000                                  HLT                             ;CLRB FAILED
       010650  104400                                  SCOPE

       010652  012737  177777  016710                  MOV     #-1,@#TEMP
       010660  012700  177770                          MOV     #-10,%0
       010664  105060  016720                          CLRB    D(0)
       010670  023727  016710  177400                  CMP     @#TEMP,#177400
       010676  001401                                  BEQ     .+4
       010700  104000                                  HLT                             ;CLRB FAILED
       010702  104400                                  SCOPE

       010704  012737  177777  016710                  MOV     #-1,@#TEMP
       010712  012700  177771                          MOV     #-7,%0
       010716  105060  016720                          CLRB    D(0)
       010722  023727  016710  000377                  CMP     @#TEMP,#000377
       010730  001401                                  BEQ     .+4
       010732  104000                                  HLT                             ;CLRB FAILED
       010734  104400                                  SCOPE

       010736  012737  177777  016710                  MOV     #-1,@#TEMP
       010744  012700  000010                          MOV     #+10,%0
       010750  105060  016700                          CLRB    C(0)
       010754  105737  016710                          TSTB    @#TEMP
       010760  001401                                  BEQ     .+4
```

```
2401  010762  104000                    HLT                             ;CLRB FAILED
2402  010764  104400                    SCOPE
2403
2404  010766  012737  177777  016710    MOV     #-1,@#TEMP
2405  010774  012700  177770            MOV     #-10.,%0
2406  011000  105160  016720            COMB    0(0)
2407  011004  105737  016710            TSTB    @#TEMP
2408  011010  001401                    BEQ     .+4
2409  011012  104000                    HLT                             ;COMB FAILED
2410  011014  104400                    SCOPE
2411
2412  011016  012737  177777  016710    MOV     #-1,@#TEMP
2413  011024  012700  000010            MOV     #10.,%0
2414  011030  105160  016700            COMB    C(0)
2415  011034  105737  016710            TSTB    @#TEMP
2416  011040  001401                    BEQ     .+4
2417  011042  104000                    HLT                             ;COMB FAILED
2418  011044  104400                    SCOPE
2419  011046  012737  177777  016710    MOV     #-1,@#TEMP
2420  011054  012700  177770            MOV     #-10.,%0
2421  011060  105260  016720            INCB    0(0)
2422  011064  105737  016710            TSTB    @#TEMP
2423  011070  001401                    BEQ     .+4
2424  011072  104000                    HLT                             ;INCB FAILED
2425  011074  023727  016710  177400    CMP     @#TEMP,#177400
2426  011102  001401                    BEQ     .+4
2427  011104  104000                    HLT                             ;INCB FAILED
2428  011106  104400                    SCOPE
2429
2430  011110  012737  177777  016710    MOV     #-1,@#TEMP
2431  011116  012700  000010            MOV     #+10.,%0
2432  011122  105260  016700            INCB    C(0)
2433  011126  105737  016710            TSTB    @#TEMP
2434  011132  001401                    BEQ     .+4
2435  011134  104000                    HLT                             ;INCB FAILED
2436  011136  104400                    SCOPE
2437
2438  011140  012737  000001  016710    MOV     #1,@#TEMP
2439  011146  012700  177770            MOV     #-10.,%0
2440  011152  105360  016720            DECB    0(0)
2441  011156  105737  016710            TSTB    @#TEMP
2442  011162  001401                    BEQ     .+4
2443  011164  104000                    HLT                             ;DECB FAILED
2444  011166  104400                    SCOPE
2445
2446  011170  012737  000001  016710    MOV     #1,@#TEMP
2447  011176  012700  000010            MOV     #10.,%0
2448  011202  105360  016700            DECB    C(0)
2449  011206  105737  016710            TSTB    @#TEMP
2450  011212  001401                    BEQ     .+4
2451  011214  104000                    HLT                             ;DECB FAILED
2452  011216  104400                    SCOPE
2453
2454  011220  012737  000001  016710    MOV     #1,@#TEMP
2455  011226  012700  177770            MOV     #-10.,%0
2456  011232  105460  016720            NEGB    0(0)
```

```
2457  011236  023727  016710  000377          CMP     @#TEMP,#377
2458  011244  001401                          BEQ     .+4
2459  011246  104000                          HLT                             ;NEGB FAILED
2460  011250  104400                          SCOPE
2461
2462  011252  012737  000001  016710          MOV     #1,@#TEMP
2463  011260  012700  000010                  MOV     #+10,%0
2464  011264  105460  016700                  NEGB    C(0)
2465  011270  023727  016710  000377          CMP     @#TEMP,#377
2466  011276  001401                          BEQ     .+4
2467  011300  104000                          HLT                             ;NEGB FAILED
2468  011302  104400                          SCOPE
2469
2470  011304  012737  177777  016710          MOV     #-1,@#TEMP
2471  011312  012700  177770                  MOV     #-10,%0
2472  011316  000261                          SEC
2473  011320  105560  016720                  ADCB    D(0)
2474  011324  023727  016710  177400          CMP     @#TEMP,#177400
2475  011332  001401                          BEQ     .+4
2476  011334  104000                          HLT                             ;ADCB FAILED
2477  011336  104400                          SCOPE
2478
2479  011340  012737  177777  016710          MOV     #-1,@#TEMP
2480  011346  012700  000010                  MOV     #+10,%0
2481  011352  000261                          SEC
2482  011354  105560  016700                  ADCB    C(0)
2483  011360  023727  016710  177400          CMP     @#TEMP,#177400
2484  011366  001401                          BEQ     .+4
2485  011370  104000                          HLT                             ;ADCB FAILED
2486  011372  104400                          SCOPE
2487
2488  011374  012737  000401  016710          MOV     #401,@#TEMP
2489  011402  012700  177771                  MOV     #-7,%0
2490  011406  000261                          SEC
2491  011410  105660  016720                  SBCB    D(0)
2492  011414  022737  000001  016710          CMP     #1,@#TEMP
2493  011422  001401                          BEQ     .+4
2494  011424  104000                          HLT                             ;SBCB FAILED
2495  011426  104400                          SCOPE
2496
2497  011430  012737  000001  016710          MOV     #1,@#TEMP
2498  011436  012700  000010                  MOV     #+10.%0
2499  011442  000261                          SEC
2500  011444  105660  016700                  SBCB    C(0)
2501  011450  005737  016710                  TST     @#TEMP
2502  011454  001401                          BEQ     .+4
2503  011456  104000                          HLT                             ;SBCB FAILED
2504  011460  104400                          SCOPE
2505
2506                                  ;TEST INDIRECT ADDRESSING
2507                                  ;TEST COMPARE INSTRUCTION
2508  011462  123727  016656  000252          CMPB    @#8,#000252
2509  011470  001401                          BEQ     .+4
2510  011472  104000                          HLT                             ;CMP8 FAILED
2511  011474  104400                          SCOPE
2512
```

```
 2513  011476  123727  016657  000252          CMPB    @#B+1,#252
 2514  011504  001401                          BEQ     .+4
 2515  011506  104000                          HLT                             ;CMPB FAILED
 2516  011510  104400                          SCOPE
 2517
 2518
 2519  011512  122737  125252  016656          CMPB    #125252,@#B
 2520  011520  001401                          BEQ     .+4
 2521  011522  104000                          HLT                             ;CMPB FAILED
 2522  011524  104400                          SCOPE
 2523
 2524  011526  123737  016656  016656          CMPB    @#B,@#B
 2525  011534  001401                          BEQ     .+4
 2526  011536  104000                          HLT                             ;CMPB FAILED
 2527  011540  104400                          SCOPE
 2528
 2529                          ;TEST MOVE INSTRUCTIONS
 2530  011542  113700  016656                  MOVB    @#B,%0
 2531  011546  122700  000252                  CMPB    #000252,%0
 2532  011552  001401                          BEQ     .+4
 2533  011554  104000                          HLT                             ;MOVB FAILED
 2534  011556  104400                          SCOPE
 2535
 2536  011560  112737  125252  016710          MOVB    #125252,@#TEMP
 2537  011566  126737  005064  016710          CMPB    B,@#TEMP
 2538  011574  001401                          BEQ     .+4
 2539  011576  104000                          HLT                             ;MOVB FAILED
 2540  011600  104400                          SCOPE
 2541
 2542  011602  113737  016656  016700          MOVB    @#B,@#C
 2543  011610  126737  005042  016700          CMPB    B,@#C
 2544  011616  001401                          BEQ     .+4
 2545  011620  104000                          HLT                             ;MOVB FAILED
 2546  011622  104400                          SCOPE
 2547                          ;TEST UNARYS INDIRECT
 2548  011624  012737  177777  016710          MOV     #-1,@#TEMP
 2549  011632  105037  016710                  CLRB    @#TEMP
 2550  011636  023727  016710  177400          CMP     @#TEMP,#177400
 2551  011644  001401                          BEQ     .+4
 2552  011646  104000                          HLT                             ;CLRB FAILED
 2553  011650  104400                          SCOPE
 2554
 2555  011652  012737  125252  016710          MOV     #125252,@#TEMP
 2556  011660  105137  016710                  COMB    @#TEMP
 2557  011664  022737  125125  016710          CMP     #125125,@#TEMP
 2558  011672  001401                          BEQ     .+4
 2559  011674  104000                          HLT                             ;COMB FAILED
 2560  011676  104400                          SCOPE
 2561
 2562  011700  012737  125252  016710          MOV     #125252,@#TEMP
 2563  011706  105137  016711                  COMB    @#TEMP+1
 2564  011712  022737  052652  016710          CMP     #052652,@#TEMP
 2565  011720  001401                          BEQ     .+4
 2566  011722  104000                          HLT                             ;COMB FAILED
 2567  011724  104400                          SCOPE
 2568
```

```
2569  011726  005037  016710          CLR     @#TEMP
2570  011732  105237  016711          INCB    @#TEMP+1
2571  011736  022737  000400  016710  CMP     #400,@#TEMP
2572  011744  001401                  BEQ     .+4
2573  011746  104000                  HLT                             ;INCB FAILED
2574  011750  104400                  SCOPE
2575
2576  011752  005037  016710          CLR     @#TEMP
2577  011756  105377  004730          DECB    @TEMP+2
2578  011762  023727  016710  000377  CMP     @#TEMP,#377
2579  011770  001401                  BEQ     .+4
2580  011772  104000                  HLT                             ;DECB FAILED
2581  011774  104400                  SCOPE
2582
2583  011776  005037  016710          CLR     @#TEMP
2584  012002  112737  000001  016711  MOVB    #1,@#TEMP+1
2585  012010  105437  016711          NEGB    @#TEMP+1
2586  012014  022737  177400  016710  CMP     #177400,@#TEMP
2587  012022  001401                  BEQ     .+4
2588  012024  104000                  HLT                             ;NEGB FAILED
2589  012026  104400                  SCOPE
2590
2591                          ;TEST INDIRECT ADDRESSING WITH INDEXING
2592                          ;TEST COMPARE INSTRUCTION
2593  012030  127727  004624  125252          CMPB    @B+2,#125252
2594  012036  001401                  BEQ     .+4
2595  012040  104000                  HLT                             ;CMPB FAILED
2596  012042  104400                  SCOPE
2597
2598  012044  122777  125252  004606          CMPB    #125252,@B+2
2599  012052  001401                  BEQ     .+4
2600  012054  104000                  HLT                             ;CMPB FAILED
2601  012056  104400                  SCOPE
2602
2603  012060  127777  004574  004572          CMPB    @B+2,@B+2
2604  012066  001401                  BEQ     .+4
2605  012070  104000                  HLT                             ;CMPB FAILED
2606  012072  104400                  SCOPE
2607                          ;TEST MOVE INSTRUCTIONS
2608  012074  117700  004560          MOVB    @B+2,%0
2609  012100  122700  125252          CMPB    #125252,%0
2610  012104  001401                  BEQ     .+4
2611  012106  104000                  HLT                             ;MOVB FAILED
2612  012110  104400                  SCOPE
2613
2614  012112  112777  125252  004572  MOVB    #125252,@TEMP+2
2615  012120  126737  004532  016710  CMPB    B,@#TEMP
2616  012126  001401                  BEQ     .+4
2617  012130  104000                  HLT                             ;MOVB FAILED
2618  012132  104400                  SCOPE
2619
2620  012134  117777  004520  004540  MOVB    @B+2,@C+2
2621  012142  126737  004510  016700  CMPB    B,@#C
2622  012150  001401                  BEQ     .+4
2623  012152  104000                  HLT                             ;MOVB FAILED
2624  012154  104400                  SCOPE
```

```
                                ;TEST BIC INSTRUCTION INDIRECT WITH INDEXING
2627  012156  012700  177777          MOV     #-1,%0
2628  012162  147700  004472          BICB    @#+2,%0
2629  012166  120027  052525          CMPB    %0,#52525
2630  012172  001401                  BEQ     .+4
2631  012174  104000                  HLT                             ;BICB FAILED
2632  012176  104400                  SCOPE
2633
2634  012200  012737  177777  016710  MOV     #-1,@#TEMP
2635  012206  147777  125252  004476  BICB    #125252,@TEMP+2
2636  012214  122737  052525  016710  CMPB    #52525,@#TEMP
2637  012222  001401                  BEQ     .+4
2638  012224  104000                  HLT                             ;BICB FAILED
2639  012226  104400                  SCOPE
2640
2641  012230  012737  177777  016700  MOV     #-1,@#C
2642  012236  147777  004416  004436  BICB    @#+2,@C+2
2643  012244  126737  004426  016700  CMPB    A+10,@#C
2644  012252  001401                  BEQ     .+4
2645  012254  104000                  HLT                             ;BICB FAILED
2646  012256  104400                  SCOPE
2647                            ;TEST UNARYS INDIRECT WITH INDEXING
2648  012260  012737  177777  016710  MOV     #-1,@#TEMP
2649  012266  105077  004420          CLRB    @TEMP+2
2650  012272  105737  016710          TSTB    @#TEMP
2651  012276  001401                  BEQ     .+4
2652  012300  104000                  HLT                             ;CLRB FAILED
2653  012302  104400                  SCOPE
2654
2655  012304  012737  125252  016710  MOV     #125252,@#TEMP
2656  012312  105177  004374          COMB    @TEMP+2
2657  012316  122737  052525  016710  CMPB    #052525,@#TEMP
2658  012324  001401                  BEQ     .+4
2659  012326  104000                  HLT                             ;COMB FAILED
2660  012330  104400                  SCOPE
2661
2662  012332  005037  016710          CLR     @#TEMP
2663  012336  105277  004350          INCB    @TEMP+2
2664  012342  122737  000001  016710  CMPB    #1,@#TEMP
2665  012350  001401                  BEQ     .+4
2666  012352  104000                  HLT                             ;INCB FAILED
2667  012354  104400                  SCOPE
2668
2669  012356  005037  016710          CLR     @#TEMP
2670  012362  105377  004324          DECB    @TEMP+2
2671  012366  123727  016710  177777  CMPB    @#TEMP,#-1
2672  012374  001401                  BEQ     .+4
2673  012376  104000                  HLT                             ;DECB FAILED
2674  012400  104400                  SCOPE
2675
2676  012402  012737  000001  016710  MOV     #1,@#TEMP
2677  012410  105477  004276          NEGB    @TEMP+2
2678  012414  122737  177777  016710  CMPB    #-1,@#TEMP
2679  012422  001401                  BEQ     .+4
2680  012424  104000                  HLT                             ;NEGB FAILED
```

```
 2681  012426  104400                          SCOPE
 2682
 2683  012430  012737  177777  016710          MOV     #-1,@#TEMP
 2684  012436  000261                          SEC
 2685  012440  105577  004246                  ADCB    @TEMP+2
 2686  012444  022737  177400  016710          CMP     #177400,@#TEMP
 2687  012452  001401                          BEQ     .+4
 2688  012454  104000                          HLT                             ;ADCB FAILED
 2689  012456  105737  016710                  TSTB    @#TEMP
 2690  012462  001401                          BEQ     .+4
 2691  012464  104000                          HLT                             ;TSTB FAILED
 2692  012466  104400                          SCOPE
 2693
 2694  012470  012737  000001  016710          MOV     #1,@#TEMP
 2695  012476  000261                          SEC
 2696  012500  105377  004206                  DECB    @TEMP+2
 2697  012504  005737  016710                  TST     @#TEMP
 2698  012510  001401                          BEQ     .+4
 2699  012512  104000                          HLT                             ;DECB FAILED
 2700  012514  104400                          SCOPE
 2701
 2702                                  ;TEST OF COMBINED INDEXING AND INDIRECT
 2703  012516  012700  177772                  MOV     #-6,%0
 2704  012522  127027  016666  125252          CMPB    @A(0),#125252
 2705  012530  001401                          BEQ     .+4
 2706  012532  104000                          HLT                             ;CMPB FAILED
 2707  012534  104400                          SCOPE
 2708
 2709  012536  012700  177772                  MOV     #-6,%0
 2710  012542  122770  125252  016666          CMPB    #125252,@A(0)
 2711  012550  001401                          BEQ     .+4
 2712  012552  104000                          HLT                             ;CMPB FAILED
 2713  012554  104400                          SCOPE
 2714
 2715  012556  012700  177772                  MOV     #-6,%0
 2716  012562  012701  000002                  MOV     #+2,%1
 2717  012566  127071  016666  016666          CMPB    @A(0),@A(1)
 2718  012574  001401                          BEQ     .+4
 2719  012576  104000                          HLT                             ;CMPB FAILED
 2720  012600  104400                          SCOPE
 2721                                  ;TEST BIC INSTRUCTION
 2722  012602  012700  000006                  MOV     #+6,%0
 2723  012606  012767  177777  004074          MOV     #-1,TEMP
 2724  012614  147067  016666  004066          BICB    @A(0),TEMP
 2725  012622  122767  125252  004060          CMPB    #125252,TEMP
 2726  012630  001401                          BEQ     .+4
 2727  012632  104000                          HLT                             ;BICB FAILED
 2728  012634  104400                          SCOPE
 2729
 2730  012636  012700  177772                  MOV     #-6,%0
 2731  012642  012737  177777  016700          MOV     #-1,@#C
 2732  012650  142770  125252  016710          BICB    #125252,@TEMP(0)
 2733  012656  123727  016700  000125          CMPB    @#C,#000125
 2734  012664  001401                          BEQ     .+4
 2735  012666  104000                          HLT                             ;BICB FAILED
 2736  012670  104400                          SCOPE
```

```
2737
2738  012672  012700  016660                MOV     #B+2,%0         ;ADDRESS OF ADDRESS OF B
2739  012676  023067  003754                CMP     @(0)+,B
2740  012702  001401                        BEQ     .+4
2741  012704  104000                        HLT                             ;CMP FAILED
2742  012706  104400                        SCOPE
2743
2744  012710  012700  016662                MOV     #B+4,%0
2745  012714  025067  003736                CMP     @-(0),B
2746  012720  001401                        BEQ     .+4
2747  012722  104000                        HLT                             ;CMP FAILED
2748  012724  104400                        SCOPE
2749
2750  012726  012700  016662                MOV     #B+4,%0
2751  012732  125067  003720                CMPB    @-(0),B
2752  012736  001401                        BEQ     .+4
2753  012740  104000                        HLT                             ;CMPB FAILED
2754  012742  104400                        SCOPE
2755
2756  012744  012700  016704                MOV     #C+4,%0
2757  012750  012737  177777  016700        MOV     #-1,@#C
2758  012756  105050                        CLRB    @-(0)
2759  012760  023727  016700  177400        CMP     @#C,#177400
2760  012766  001401                        BEQ     .+4
2761  012770  104000                        HLT                             ;CLRB FAILED
2762  012772  104400                        SCOPE
2763  012774  012737  177777  016700        MOV     #-1,@#C
2764  013002  012700  177772                MOV     #-6,%0
2765  013006  012701  177772                MOV     #-6,%1
2766  013012  147071  016666  016710        BICB    @A(0),@TEMP(1)
2767  013020  022737  177525  016700        CMP     #177525,@#C
2768  013026  001401                        BEQ     .+4
2769  013030  104000                        HLT                             ;BICB FAILED
2770  013032  104400                        SCOPE
2771                          ;TEST THAT R0 IS NOT DESTROYED BY FALSE SELECTION
2772  013034  012700  052525                MOV     #52525,%0       ;THIS IS CHECK LATER IN PROGRAM
2773                          ;TEST JSR INSTRUCTION
2774
2775  013040  004767  000002                JSR     %7, TJSR2       ;PLACE PC ON STACK
2776  013044  000405          TJSR1:        BR      TJSR3           ;RETURN HERE ON RTS %7
2777  013046  121627  013044  TJSR2:        CMPB    @%6,#TJSR1      ;CHECK FOR CORRECT PC ON STACK
2778  013052  001401                        BEQ     .+4
2779  013054  104000                        HLT                     ;INCORRECT PC ON STACK
2780  013056  000207                        RTS     %7              ;RETURN TO INST AFTER JSR
2781  013060  104400          TJSR3:        SCOPE
2782
2783  013062  000257                        CCC
2784  013064  004717                        JSR     %7,@%7          ;INSTRUCTION UNDER TEST
2785  013066  121627  013066                CMPB    @%6,#TJSR3+6            ;TEST THE STACK
2786  013072  001401                        BEQ     .+4
2787  013074  104000                        HLT                     ;PC OF JSR DID NOT GO TO STACK
2788  013076  005726                        TST     (6)+            ;REPOSITION THE STACK
2789  013100  104400                        SCOPE
2790                          ;TEST NESTED SUBROUTINES
2791
2792  013102  000257                        CCC                     ;CLEAR CONDITION CODES
```

```
2793  013104  004767  003366          JSR     %7,SUBR6
2794  013110  100401                  BMI     .+4
2795  013112  104000                  HLT                     ;JSR OR RTS FAILED
2796  013114  001401                  BEQ     .+4
2797  013116  104000                  HLT                     ;JSR OR RTS FAILED
2798  013120  102401                  BVS     .+4
2799  013122  104000                  HLT                     ;JSR OR RTS FAILED
2800  013124  103401                  BCS     .+4
2801  013126  104000                  HLT                     ;JSR OR RTS FAILED
2802  013130  104400                  SCOPE
2803                          ;TEST ROTATE ODD BYTE
2804  013132  104400                  SCOPE
2805  013134  000257                  CCC                     ;CLEAR "C"
2806  013136  012767  123456  003544  MOV     #123456,TEMP
2807  013144  106067  003541          RORB    TEMP+1          ;ROTATE ODD BYTE
2808  013150  103401                  BCS     .+4
2809  013152  104000                  HLT                     ;C NOT SET
2810  013154  102401                  BVS     .+4
2811  013156  104000                  HLT                     ;V NOT SET
2812  013160  022767  051456  003522  CMP     #051456,TEMP
2813  013166  001401                  BEQ     .+4
2814  013170  104000                  HLT                     ;ROTATE FAILED
2815  013172  104400                  SCOPE
2816  013174  000277                  SCC                     ;SET C
2817  013176  012767  123456  003504  MOV     #123456,TEMP
2818  013204  106067  003501          RORB    TEMP+1
2819  013210  103401                  BCS     .+4
2820  013212  104000                  HLT                     ;C NOT SET
2821  013214  102001                  BVC     .+4
2822  013216  104000                  HLT                     ;V NOT CLEARED
2823  013220  022767  151456  003462  CMP     #151456,TEMP
2824  013226  001401                  BEQ     .+4
2825  013230  104000                  HLT                     ;ROTATE FAILED
2826  013232  104400                  SCOPE
2827
2828  013234  000257                  CCC
2829  013236  012767  123456  003444  MOV     #123456,TEMP
2830  013244  106167  003441          ROLB    TEMP+1
2831  013250  103401                  BCS     .+4
2832  013252  104000                  HLT                     ;C NOT SET
2833  013254  102401                  BVS     .+4
2834  013256  104000                  HLT                     ;V NOT SET
2835  013260  022767  047056  003422  CMP     #047056,TEMP
2836  013266  001401                  BEQ     .+4
2837  013270  104000                  HLT                     ;ROTATE BYTE FAILED
2838  013272  104400                  SCOPE
2839
2840  013274  000277                  SCC                     ;SET C
2841  013276  012767  123456  003404  MOV     #123456,TEMP
2842  013304  106167  003401          ROLB    TEMP+1
2843  013310  103401                  BCS     .+4
2844  013312  104000                  HLT                     ;C NOT SET
2845  013314  102401                  BVS     .+4
2846  013316  104000                  HLT                     ;V NOT SET
2847  013320  022767  047456  003362  CMP     #047456,TEMP
2848  013326  001401                  BEQ     .+4
```

```
                013330  104000                  HLT                             ;ROTATE ODD BYTE FAILED
                013332  104400                  SCOPE
                013334  000257                  CCC                             ;CLEAR C
                013336  012767  177777  003344  MOV     #-1,TEMP
                013344  106367  003341          ASRB    TEMP+1
                013350  103401                  BCS     .+4
                013352  104000                  HLT                             ;C NOT SET
                013354  102001                  BVC     .+4
                013356  104000                  HLT                             ;V NOT CLEARED
                013360  026727  003324  177777  CMP     TEMP,#-1
                013366  001401                  BEQ     .+4
                013370  104000                  HLT                             ;SHIFT FAILED
                013372  104400                  SCOPE
                013374  000277                  SCC
                013376  012767  177777  003304  MOV     #-1,TEMP
                013404  106367  003301          ASLB    TEMP+1
                013410  103401                  BCS     .+4
                013412  104000                  HLT                             ;C NOT SET
                013414  102001                  BVC     .+4
                013416  104000                  HLT                             ;V NOT CLEARED
                013420  026727  003264  177377  CMP     TEMP,#177377
                013426  001401                  BEQ     .+4
                013430  104000                  HLT                             ;SHIFT BYTE FAILED
                013432  104400                  SCOPE
                                        ;TEST COMBINATION OF N, C AND V
                                        .MACR   TNCV
                                                BPL     .+12
                                                BCC     .+20                    ;Z=1
                                                BVC     .+30                    ;Z=1, C=1
                                                HLT                             ;Z=C, BUT V=1
                                                BR      .+24
                                                BCC     .+16                    ;Z=0
                                                BVS     .+20                    ;Z=0, C=1
                                                HLT                             ;Z NOT EQUAL C, V=1
                                                BR      .+14
                                                BVS     .+12                    ;Z=1, C=0
                                                HLT                             ;Z NOT EQUAL C, V=1
                                                BR      .+6
                                                BVC     .+4                     ;Z=0, C=0
                                                HLT                             ;Z=C, BUT V=1
                                                SCOPE
                                                .ENDM
                013434  005037  016440          CLR     @#ICOUNT                        ;NO ITERATION

                                        ;TEST ROTATING NUMBERS
                013440  104400                  SCOPE
                013442  012767  177777  000142  MOV     #-1,REFF                ;INITIALIZE BASE NUMBER
                013450  005267  000136  TSROT:  INC     REFF                    ;INCREMENT NUMBER
                013454  004767  000012          JSR     %7,ROTALL               ;GO TO COMPARE ROUTINE
                013460  026727  000126  100077  CMP     REFF,#100077            ;TEST ALL VALUES
                013466  001370                  BNE     TSROT                   ;NO TEST THEM ALL
                013470  000452                  BR      TSRT2A                  ;WE ARE DONE

                013472  016767  000114  000114  ROTALL: MOV     REFF,TEST
```

```
013500  006167  000110                          ROL     TEST
013504  006067  000104                          ROR     TEST
013510  006067  000100                          ROR     TEST
013514  006067  000074                          ROR     TEST
013520  006067  000070                          ROR     TEST
013524  006167  000064                          ROL     TEST
013530  006167  000060                          ROL     TEST
013534  006167  000054                          ROL     TEST
013540                                          TNCV
013540  100004                                  BPL     .+12
013542  103007                                  BCC     .+20                    ;Z=1
013544  102013                                  BVC     .+30                    ;Z=1, C=1
013546  104000                                  HLT                             ;Z=C, BUT V=1
013550  000411                                  BR      .+24
013552  103006                                  BCC     .+16                    ;Z=0
013554  102407                                  BVS     .+20                    ;Z=0, C=1
013556  104000                                  HLT                             ;Z NOT EQUAL C, V=1
013560  000405                                  BR      .+14
013562  102404                                  BVS     .+12                    ;Z=1, C=0
013564  104000                                  HLT                             ;Z NOT EQUAL C, V=1
013566  000402                                  BR      .+6
013570  102001                                  BVC     .+4                     ;Z=0, C=0
013572  104000                                  HLT                             ;Z=C, BUT V=1
013574  104400                                  SCOPE
013576  026767  000012  000006                  CMP     TEST,REFF
013604  001401                                  BEQ     .+4
013606  104000                                  HLT                             ;INITIAL NOT EQUAL TO FINAL
013610  000207                                  RTS     %7                      ;ROTATE WORD FAILED
013612  000000                          REFF:   0                               ;GOOD DATA
013614  000000                          TEST:   0                               ;BAD DATA
        013612                                  REF=REFF
                                        ;TEST ROTATING BYTE EVEN/ODD, ALL NUMBERS
013616  012767  177777  177766  TSRT2A: MOV     #-1,REFF
013624  005267  177762          TSROT2: INC     REFF
013630  004767  000016                          JSR     %7,ROTBE
013634  004767  000122                          JSR     %7,ROTBO
013640  022767  177777  177744                  CMP     #-1,REFF
013646  001366                                  BNE     TSROT2
013650  000505                                  BR      ROTEN1
013652  016767  177734  177734  ROTBE:  MOV     REFF,TEST               ;ROTATE BYTE EVEN
013660  106067  177730                          RORB    TEST
013664  106067  177724                          RORB    TEST
013670  106067  177720                          RORB    TEST
013674  106167  177714                          ROLB    TEST
013700  106167  177710                          ROLB    TEST
013704  106167  177704                          ROLB    TEST
013710                                          TNCV
013710  100004                                  BPL     .+12
013712  103007                                  BCC     .+20                    ;Z=1
013714  102013                                  BVC     .+30                    ;Z=1, C=1
013716  104000                                  HLT                             ;Z=C, BUT V=1
013720  000411                                  BR      .+24
013722  103006                                  BCC     .+16                    ;Z=0
013724  102407                                  BVS     .+20                    ;Z=0, C=1
013726  104000                                  HLT                             ;Z NOT EQUAL C, V=1
013730  000405                                  BR      .+14
```

```
2961  013732  102404                          BVS     .+12                    ;Z=1, C=0
2962  013734  104000                          HLT                             ;Z NOT EQUAL C, V=1
2963  013736  000402                          BR      .+6
2964  013740  102001                          BVC     .+4                     ;Z=0, C=0
2965  013742  104000                          HLT                             ;Z=C, BUT V=1
2966  013744  104400                          SCOPE
2967  013746  026767  177642  177636        CMP     TEST,REFF
2968  013754  001401                          BEQ     .+4
2969  013756  104000                          HLT
2970  013760  000207                          RTS     %7
2971  013762  106067  177627        ROTBO:  RORB    TEST+1                  ;ROTATE BYTE ODD
2972  013766  106067  177623                  RORB    TEST+1
2973  013772  106067  177617                  RORB    TEST+1
2974  013776  106167  177613                  ROLB    TEST+1
2975  014002  106167  177607                  ROLB    TEST+1
2976  014006  106167  177603                  ROLB    TEST+1
2977  014012                                  TNCV
2978  014012  100004                          BPL     .+12
2979  014014  103007                          BCC     .+20                    ;Z=1
2980  014016  102013                          BVC     .+30                    ;Z=1, C=1
2981  014020  104000                          HLT                             ;Z=C, BUT V=1
2982  014022  000411                          BR      .+24
2983  014024  103006                          BCC     .+16                    ;Z=0
2984  014026  102407                          BVS     .+20                    ;Z=0, C=1
2985  014030  104000                          HLT                             ;Z NOT EQUAL C, V=1
2986  014032  000405                          BR      .+14
2987  014034  102404                          BVS     .+12                    ;Z=1, C=0
2988  014036  104000                          HLT                             ;Z NOT EQUAL C, V=1
2989  014040  000402                          BR      .+6
2990  014042  102001                          BVC     .+4                     ;Z=0, C=0
2991  014044  104000                          HLT                             ;Z=C, BUT V=1
2992  014046  104400                          SCOPE
2993  014050  026767  177540  177534        CMP     TEST,REFF
2994  014056  001401                          BEQ     .+4
2995  014060  104000                          HLT
2996  014062  000207                          RTS     %7
```

```
 2997  014064  104400                  ROTEN1: SCOPE
 2998                                  ;WILL ALLOW TWO FAST PASSES
 2999  014066  005227  177776                  INC     #177776
 3000  014072  100002                          BPL     .+6
 3001  014074  000167  000632                  JMP     EAESRT
 3002                                  ;ADD AND SUBTRACT ALL NUMBERS AGAINST FIXED NUMBERS
 3003                                  ;A+B=C, C-A=B, BF SHOULD EQUAL BI
 3004  014100  011667  000072          TSTARI: MOV     @#6,NUMA
 3005  014104  012767  000001  177500          MOV     #1,REF
 3006  014112  005267  177474          ARITST: INC     REF
```

```
3007  014116  004767  000014                      ISB     %7,ADSUB
3008  014122  022767  177777  177462              CMP     #-1,REFF
3009  014130  001370                              BNE     ARITST
3010  014132  000422                              BR      ARIEND
3011  014134  104400                              SCOPE
3012  014136  016767  177450  177450  ADSUB:     MOV     REF,TEST
3013  014144  066767  000026  177442              ADD     NUMA,TEST
3014  014152  166767  000020  177434              SUB     NUMA,TEST
3015  014160  026767  177426  177426              CMP     REF,TEST
3016  014166  001401                              BEQ     .+4
3017  014170  104000                              HLT
3018  014172  104400                              SCOPE
3019  014174  000207                              RTS     %7
3020  014176  000000                  NUMA:       0
3021  014200  104400                  ARIEND:     SCOPE
3022
3023                                  ;TEST ALL COMBINATIONS OF NUMBERS WITH COMPARE INSTRUCTION
3024  014202  005002                  COMPAR:     CLR     %2                      ;INIT %2
3025  014204  005001                              CLR     %1                      ;INIT %1
3026  014206  020201                  CMP1:       CMP     %2,%1                   ;ARE THE EQUAL
3027  014210  001401                              BEQ     .+4
3028  014212  104000                              HLT                             ;R0 AND R1 DID NOT COMPARE
3029  014214  020227  177777                      CMP     %2,#-1                  ;AT UPPER LIMIT
3030  014220  001403                              BEQ     CMP2                    ;YES EXIT
3031  014222  005202                              INC     %2                      ;INCREMENT TO NEXT NUMBER
3032  014224  005201                              INC     %1
3033  014226  000767                              BR      CMP1
3034  014230  104400                  CMP2:       SCOPE
3035                                  ;TEST COMPLIMENTING ALL NUMBERS
3036  014232  005067  002452                      CLR     TEMP                    ;BASE DATA
3037  014236  005067  002452                      CLR     TEMP+4                  ;BASE REFERENCE
3038  014242  005167  002442          TCOM:       COM     TEMP                    ;COMPLIMENT DATA
3039  014246  005367  002442                      DEC     TEMP+4                  ;DECREMENT REFERENCE
3040  014252  026767  002432  002434              CMP     TEMP,TEMP+4             ;COMPARE
3041  014260  001401                              BEQ     .+4                     ;TEST
3042  014262  104000                              HLT                             ;COMPLIMENT OR DECREMENT FAILED
3043  014264  005167  002420                      COM     TEMP
3044  014270  005267  002414                      INC     TEMP                    ;INCREMENT AND TEST FOR DONE
3045  014274  001362                              BNE     TCOM                    ;NOT FINISHED GO LOOP
3046  014276  104400                              SCOPE
3047
3048                                  ;TEST COMB (EVEN BYTE)
3049  014300  005067  002404                      CLR     TEMP                    ;BASE DATA
3050  014304  005067  002404                      CLR     TEMP+4                  ;REFERENCE DATA
3051  014310  105167  002374          TCOM2:      COMB    TEMP
3052  014314  005367  002374                      DEC     TEMP+4
3053  014320  126767  002364  002366              CMPB    TEMP,TEMP+4             ;COMPARE
3054  014326  001401                              BEQ     .+4
3055  014330  104000                              HLT                             ;COMPLIMENT OR INCREMENT BYTE FAILED
3056  014332  105167  002352                      COMB    TEMP
3057  014336  105267  002346                      INCB    TEMP
3058  014342  001362                              BNE     TCOM2
3059  014344  104400                              SCOPE
3060                                  ;TEST COMB (ODD BYTE)
3061  014346  005067  002336                      CLR     TEMP                    ;BASE DATA
3062  014352  005067  002336                      CLR     TEMP+4                  ;REFERENCE DATA
```

```
 3063  014356  105167  002327          TCOM3:  COMB    TEMP+1          ;ODD BYTE
 3064  014362  005367  002326                  DEC     TEMP+4
 3065  014366  126767  002317  002320          CMPB    TEMP+1,TEMP+4
 3066  014374  001401                          BEQ     .+4
 3067  014376  104000                          HLT                     ;COMPLIMENT BYTE FAILED
 3068  014400  105167  002305                  COMB    TEMP+1
 3069  014404  105267  002301                  INCB    TEMP+1
 3070  014410  001362                          BNE     TCOM3
 3071  014412  104400                          SCOPE
 3072
 3073                          ;TEST COMPARE ALL VALUE EVEN BYTE WITH ODD
 3074  014414  005067  002270                  CLR     TEMP            ;BASE VALUE
 3075  014420  126767  002264  002263  TSCOMB: CMPB    TEMP,TEMP+1     ;COMPARE
 3076  014426  001401                          BEQ     .+4
 3077  014430  104000                          HLT                     ;COMPARE FAILED
 3078  014432  002001                          BGE     .+4
 3079  014434  104000                          HLT                     ;V IS NOT = TO N
 3080  014436  003401                          BLE     .+4
 3081  014440  104000                          HLT                     ;V IS SET
 3082  014442  062767  000401  002240          ADD     #401,TEMP
 3083  014450  022767  177777  002232          CMP     #-1,TEMP
 3084  014456  001360                          BNE     TSCOMB
 3085  014460  104400                          SCOPE
 3086  014462  012737  004000  016440          MOV     #4000,@#ICOUNT
 3087  014470  104400                  WAIT3:  SCOPE
 3088  014472                          WAIT5:
 3089  014472  012737  000010  016440          MOV     #10,@#ICOUNT
 3090
 3091                          ;TEST TO SEE IF I/O DEVICES WERE SELECTED
 3092  014500  122737  000377  001516          CMPB    #377,@#REG1             ;SELECTED DEVICES STORED IN REG1
 3093  014506  001404                          BEQ     WAIT4           ;BRANCH IF NO DEVICES SELECTED
 3094  014510  000001                          WAIT                    ;INTERRUPTS WILL OCCUR
 3095  014512  000001                          WAIT                    ;IF DEVICES ARE SELECTED
 3096  014514  000001                          WAIT
 3097  014516  000001                          WAIT
 3098  014520  104400                  WAIT4:  SCOPE
 3099  014522  012737  004000  016440          MOV     #4000,@#ICOUNT
 3100
 3101                          ;TEST SWAB
 3102  014530  012767  000200  177056          MOV     #0200,TEST
 3103  014536  000367  177052                  SWAB    TEST
 3104  014542  100001                          BPL     .+4
 3105  014544  104000                          HLT
 3106  014546  001401                          BEQ     .+4
 3107  014550  104000                          HLT
 3108  014552  000367  177036                  SWAB    TEST
 3109  014556  100401                          BMI     .+4
 3110  014560  104000                          HLT
 3111  014562  001001                          BNE     .+4
 3112  014564  104000                          HLT
 3113  014566  104400                          SCOPE
 3114  014570  005037  016440                  CLR     @#ICOUNT
 3115
 3116                          ;TEST ALL COMBINATIONS OF SWAB
 3117  014574  005067  177014                  CLR     TEST            ;NUMBER UNDER TEST
 3118  014600  005067  177006                  CLR     REF             ;REFERENCE NUMBER
```

```
3119  014604  000367  177004          SWABA:  SWAB    TEST            ;OPERATION UNDER TEST
3120  014610  026767  177000  176774          CMP     TEST,REF        ;TEST SWAB INSTRUCTION
3121  014616  001401                          BEQ     .+4
3122  014620  104000                          HLT                     ;SWAB FAILED
3123  014622  000367  176766                  SWAB    TEST
3124  014626  005267  176760                  INC     REF             ;INCREMENT REFERENCE NUMBER
3125  014632  105267  176757                  INCB    TEST+1          ;INC TEST NUMBER
3126  014636  001362                          BNE     SWABA           ;LOOP TILL DONE
3127  014640  104400                          SCOPE
3128  014642  012737  004000  016440          MOV     #4000,@#ICOUNT
3129          000240                  NOP=240
3130          177776                  CC=177776
3131
3132  014650  012767  177777  002032          MOV     #-1,TEMP
3133  014656  000261                          SEC
3134  014660  105567  002025                  ADCB    TEMP+1
3135  014664  103401                          BCS     .+4
3136  014666  104000                          HLT                     ;ADCB FAILED
3137  014670  022767  000377  002012          CMP     #377,TEMP
3138  014676  001401                          BEQ     .+4
3139  014700  104000                          HLT                     ;ADCB FAILED
3140  014702  104400                          SCOPE
3141                          ;PROBLEM 11S 0300 17 AUG 1972
3142  014704  012703  000100                  MOV     #100,%3
3143  014710  012705  016710                  MOV     #TEMP,%5
3144  014714  012737  177777  016710          MOV     #-1,@#TEMP
3145  014722  030315                          BIT     %3,@%5
3146  014724  001001                          BNE     .+4
3147  014726  104000                          HLT                     ;BIT FAILED
3148  014730  104400                          SCOPE
3149  014732  000402          EAESRT: BR      .+6                     ;NOP IF NO EAE
3150  014734  000167  000362                  JMP     ENDEAE
3151                          ;TEST LEFT SHIFT
3152  014740  104400                          SCOPE                   ;TEST OF LOGICAL SHIFT
3153  014742  005077  163402                  CLR     @MQ             ;LOAD MQ WITH 0
3154  014746  012777  125252  163376          MOV     #125252,@AC     ;LOAD AC WITH 125252
3155  014754  012777  177760  163404          MOV     #-16.,@LSH      ;LOAD SHIFT COUNT (LSH) WITH -16
3156  014762  005777  163364                  TST     @AC             ;COMPARE AC WITH 0
3157  014766  001401                          BEQ     .+4             ;GO TO HLT IF BAD
3158  014770  104000                          HLT
3159  014772  022777  125252  163350          CMP     #125252,@MQ     ;COMPARE MQ WITH 125252
3160  015000  001401                          BEQ     .+4             ;GO TO HLT IF BAD
3161  015002  104000                          HLT
3162  015004  122777  000020  163344          CMPB    #20,@SRE                ;COMPARE SR WITH 2
3163  015012  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3164  015014  104000                          HLT                     ;HALT ON ERROR (LEFT SHIFT)
3165
3166                          ;TEST RIGHT SHIFT
3167  015016  104400                          SCOPE                   ;TEST OF ARITHMETIC SHIFT
3168  015020  005077  163324                  CLR     @MQ             ;LOAD MQ WITH 0
3169  015024  012777  177777  163320          MOV     #-1,@AC         ;LOAD AC WITH -1
3170  015032  012777  000020  163330          MOV     #16.,@ASH       ;LOAD SHIFT COUNT (ASH) WITH 16.
3171  015040  005777  163306                  TST     @AC             ;COMPARE AC WITH 100000
3172  015044  100401                          BMI     .+4             ;SKIP HLT IF GOOD
3173  015046  104000                          HLT                     ;HALT ON ERROR
3174  015050  005777  163274                  TST     @MQ             ;COMPARE MQ WITH 0
```

```
3175  015054  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3176  015056  104000                          HLT                     ;HALT ON ERROR
3177  015060  122777  000110  163270          CMPB    #110,@SRE       ;COMPARE SR WITH 10
3178  015066  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3179  015070  104000                          HLT                     ;HALT ON ERROR (RIGHT SHIFT)
3180
3181                                  ;TEST NORMALIZE
3182  015072  104400                          SCOPE                   ;TEST OF NORMALIZE
3183  015074  012777  125252  163246          MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3184  015102  012777  170000  163242          MOV     #170000,@AC     ;LOAD AC WITH 170000
3185  015110  005077  163250                  CLR     @NOR            ;START NORMALIZE
3186  015114  022777  100005  163230          CMP     #100005,@AC     ;COMPARE AC WITH 100005
3187  015122  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3188  015124  104000                          HLT                     ;HALT ON ERROR
3189  015126  022777  052520  163214          CMP     #52520,@MQ      ;COMPARE MQ WITH 52520
3190  015134  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3191  015136  104000                          HLT                     ;HALT ON ERROR
3192  015140  122777  000003  163206          CMPB    #3,@SC          ;COMPARE SC WITH 3
3193  015146  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3194  015150  104000                          HLT                     ;HALT ON ERROR (NORMALIZE)
3195                                  ;TEST MULTIPLY
3196  015152  104400                          SCOPE                   ;TEST OF MULTIPLY
3197  015154  012777  125252  163166          MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3198  015162  012777  040000  163170          MOV     #40000,@MUL     ;LOAD MUL WITH 40000
3199  015170  022777  165252  163154          CMP     #165252,@AC     ;COMPARE AC WITH 1652
3200  015176  001401                          BEQ     .+4             ;SKIP IF GOOD
3201  015200  104000                          HLT                     ;HALT ON ERROR
3202  015202  005777  163142                  TST     @MQ             ;COMPARE MQ WITH 10000
3203  015206  100401                          BMI     .+4             ;SKIP HLT IF GOOD
3204  015210  104000                          HLT                     ;HALT ON ERROR
3205  015212  122777  000300  163136          CMPB    #300,@SRE       ;COMPARE SR WITH 300
3206  015220  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3207  015222  104000                          HLT                     ;HALT ON ERROR (MULTIPLY)
3208
3209                                  ;TEST DIVIDE
3210  015224  104400                          SCOPE                   ;TEST OF DIVIDE
3211  015226  012777  125252  163114          MOV     #125252,@MQ     ;LOAD MQ WITH 125252
3212  015234  012777  177777  163110          MOV     #-1,@AC         ;LOAD AC WITH -1
3213  015242  012777  000002  163112          MOV     #2,@DIV         ;LOAD DIV WITH 2 AND DIVIDE
3214  015250  005777  163076                  TST     @AC             ;COMPARE AC WITH 0 (QUOTIANT)
3215  015254  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3216  015256  104000                          HLT                     ;HALT ON ERROR
3217  015260  022777  152525  163062          CMP     #152525,@MQ     ;COMPARE MQ WITH 152525
3218  015266  001401                          BEQ     .+4             ;SKIP HLT IF GOOD
3219  015270  104000                          HLT                     ;DIVIDE ERROR
3220  015272  104400                          SCOPE
3221  015274  012767  177777  001406          MOV     #-1,TEMP
3222  015302  000261                          SEC
3223  015304  105667  001401                  SBCB    TEMP+1
3224  015310  022767  177377  001372          CMP     #177377,TEMP
3225  015316  001401                          BEQ     .+4
3226  015320  104000                          HLT
3227  015322  104400                  ENDEAE: SCOPE
3228  015324  022700  052525                  CMP     #52525,%0
3229  015330  001401                          BEQ     .+4
3230  015332  104000                          HLT                     ;SOME OPERATION DESTROYED %0
```

```
3231  015334  012737  016504  000024          MOV     #PFAIL,@#24             ;POWER FAIL VECTOR
3232  015342  012737  000340  000026          MOV     #340,@#26               ;PROCESSOR PRIORITY
3233
3234  015350  000401                  SKPBEL: BR      .+4                     ;SKIP OVER BELL-NOP ON CORE EXPANSION
3235  015352  000501                          BR      TRPA
3236  015354  032777  000100  162702          BIT     #100,@TTCSR
3237  015362  001006                          BNE     SBELL                   ;DON'T RING BELL IF TTY IS BUSY
3238                          ;BELL ON PASS COMPLETE
3239  015364  012777  000207  000466  BELL:   MOV     #207,@TDBR
3240  015372  105777  000464                  TSTB    @TCSR
3241  015376  100375                          BPL     .-4
3242  015400  005227  000000          SBELL:  INC     #0                      ;PASS COUNT LOCATION
3243  015404  010700                          MOV     %7,%0                   ;SET UP RESERVED INSTRUCTION
3244  015406  042700  017777                  BIC     #17777,%0               ;OFFSET
3245  015412  062700  015436                  ADD     #BEG20,%0
3246  015416  010037  000010                  MOV     %0,@#10
3247  015422  006701                          6701                            ;ATTEMPT TO EXECUTE SIGN EXTEND
3248  015424  000240                          NOP
3249  015426  012737  000006  015552          MOV     #6,@#YESRT              ;NO TRAP, PROCESSOR IS NOT=20,15,05
3250  015434  000403                          BR      BEGANY
3251  015436  012737  000002  015552  BEG20:  MOV     #2,@#YESRT              ;TRAP OCCURRED
3252  015444  012737  000012  000010  BEGANY: MOV     #12,@#10                ;RESTORE HALT FOR RESERVED INC
3253                          ;ROUTINE TO CHECK FOR TRACE TRAP TO BE RUN WITH PROGRAM
3254
3255                          ;SAVE OLD CONTENTS, SET UP FOR TRACE TRAP
3256  015452  005046          YESTR:  CLR     -(6)
3257  015454  032777  010000  162512          BIT     #10000,@SRPTR           ;INHIBIT "T" TRAP IF SET
3258  015462  001013                          BNE     ACT
3259  015464  012737  015552  000014          MOV     #YESRT,@#14             ;T TRAP VECTOR
3260  015472  005167  000052                  COM     TRPB
3261  015476  001405                          BEQ     ACT
3262  015500  012716  000020                  MOV     #20,(6)                 ;SET TRACE TRAP
3263  015504  012746  004416          YESTR1: MOV     #BEGIN,-(6)             ;START OF TEST WITH TRACE ON
3264  015510  000002          YESTR2: RTI
3265  015512  013700  000042          ACT:    MOV     @#42,%0                 ;ARE WE UNDER ACT?
3266  015516  001772                          BEQ     YESTR1                  ;NO
3267  015520  012737  015532  000014          MOV     #CLEAR,@#14             ;TO BANK ZERO
3268  015526  012707  015532                  MOV     #CLEAR,%7
3269  015532  000005          CLEAR:  RESET                                   ;CLER  THE WORLD
3270  015534  004710          LOGICA: JSR     %7,@%0                          ;YES
3271  015536  000240                          NOP                             ;FOR ACT 11
3272  015540  000240                          NOP
3273  015542  000240                          NOP
3274  015544  000137  000502                  JMP     @#START
3275  015550  000000          TRPB:   0
3276  015552  000002          YESRT:  RTI                                     ;RETURN TO PROGRAM FROM TRAP - CAN BE AN RTT
3277  015554  000000                          HALT                            ;RTI FAILED
3278  015556  000137  004416          TRPA:   JMP     @#BEGIN                 ;BEGIN MODIFY BY EXPANSION
3279  015562  000000          PRFLAG: 0                                       ;PRINT ROUTINE BUSY IF NOT ZERO
3280
3281                          ;ENTERED WITH SYSTEM TRAP CALL(HLT)
3282                          ;PRINT OUT THE ERROR PC AND STATUS REGISTER
3283  015564  005767  177772  PRINT:  TST     PRFLAG                          ;IS ROUTINE BUSY
3284  015570  001401                  BEQ     .+4
3285  015572  000002                  RTI                                     ;YES EXIT
3286  015574  005267  177762                  INC     PRFLAG                  ;NO SET FLAG
```

```
3287  015600  005227  000000          INC     #0                      ;ERROR COUNT LOCATION
3288  015604  037727  162364  020000  BIT     @SRPTR,#20000           ;TEST FOR INHIBIT PRINT OUT
3289  015612  001401                  BEQ     .+4                     ;BRANCH TO PRINT
3290  015614  000501                  BR      PRINT1                  ;INHIBIT, RETURN TO MAIN STREAM
3291  015616  012667  000242          MOV     (6)+,SAVPC              ;PC OF FAILING ROUTINE
3292  015622  012667  000240          MOV     (6)+,SAVCC              ;CC OF ERROR CONDITION
3293  015626  026746                  CMP     -(6),-(6)               ;REPOSITION THE STACK
3294  015630  042767  000140  162140  BIC     #140,STATUS
3295  015636  105777  000220          TSTB    @TCSR           ;WAIT FOR FLAG
3296  015642  100375                  BPL     .-4
3297  015644  012777  000215  000206  MOV     #215,@TDBR      ;FILLER CHARACTER.
3298  015652  105777  000204          TSTB    @TCSR
3299  015656  100375                  BPL     .-4
3300  015660  012777  000212  000172  MOV     #212,@TDBR              ;LINE FEED
3301  015666  105777  000170          TSTB    @TCSR
3302  015672  100375                  BPL     .-4
3303  015674  010267  000152          MOV     %2,SAVR2                ;SAVE R2
3304  015700  010367  000150          MOV     %3,SAVR3                ;SAVE R3
3305  015704  010467  000146          MOV     %4,SAVR4                ;SAVE R4
3306  015710  016702  000150          MOV     SAVPC,%2
3307  015714  004767  000150          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
3308  015720  012777  000240  000132  MOV     #240,@TDBR              ;SPACE BETWEEN WORDS
3309  015726  105777  000130          TSTB    @TCSR
3310  015732  100375                  BPL     .-4
3311  015734  016702  000126          MOV     SAVCC,%2
3312  015740  004767  000124          JSR     %7,PRTAB                ;PRINT OCTAL NUMBER
3313  015744  012777  000240  000106  MOV     #240,@TDBR
3314  015752  105777  000104          TSTB    @TCSR
3315  015756  100375                  BPL     .-4
3316  015760  016702  000460          MOV     RETURN,%2               ;WHERE CPU TEST IS AT
3317  015764  004767  000100          JSR     %7,PRTAB
3318  015770  016702  000056          MOV     SAVR2,%2                ;RESTORE REGISTERS
3319  015774  016703  000054          MOV     SAVR3,%3
3320  016000  016704  000052          MOV     SAVR4,%4
3321  016004  012777  000377  000046  MOV     #377,@TDBR
3322  016012  105777  000044          TSTB    @TCSR
3323  016016  100375                  BPL     .-4
3324  016020  005777  162150  PRINT1: TST     @SRPTR                  ;TEST FOR HALT SWITCH
3325  016024  100001                  BPL     .+4
3326  016026  000000                  HALT                            ;HALT ON ERROR SET
3327  016030  005067  177526          CLR     PRFLAG                  ;CLEAR FLAG WHEN DONE
3328  016034  032777  000400  162132  BIT     #400,@SRPTR
3329  016042  001402                  BEQ     EXPRINT
3330  016044  000167  162432          JMP     START                   ;RESTART ON ERROR
3331  016050  000002  EXPRINT: RTI                                    ;RETURN TO MAIN STREAM
3332  016052  000000  SAVR2:  0
3333  016054  000000  SAVR3:  0
3334  016056  000000  SAVR4:  0
3335  016060  177566  TDBR:   177566                                  ;DATA
3336  016062  177564  TCSR:   177564                                  ;STATUS
3337  016064  000000  SAVPC:  0
3338  016066  000000  SAVCC:  0
3339          016762          BUFF=FIN                                ;END OF PROGRAM-SP AREA.
3340
3341  016070  005067  000252  PRTAB:  CLR     BINCT
3342  016074  005067  000244          CLR     WGTCT
```

```
3343  016100 012704 016352                MOV   #LIST,%4          ;GET LIST ADDRESS
3344  016104 012767 000005 000236         MOV   #5,ASCNT
3345  016112 012767 000007 000220         MOV   #7,SEVEN
3346  016120 012767 000001 000214         MOV   #1,DECML
3347  016126 105777 177730          WAIT1: TSTB  @TCSR
3348  016132 100375                       BPL   WAIT1
3349  016134 005702                       TST   %2
3350  016136 100404                       BMI   MINUS             ;NEG SIGN PRINT 1
3351  016140 012777 000260 177712         MOV   #260,@TDBR        ;POS SIGN PRINT 0
3352  016146 000403                       BR    STAR
3353  016150 012777 000261 177702 MINUS: MOV   #261,@TDBR
3354  016156 016703 000156        STAR:  MOV   SEVEN,%3          ;PUT MASK IN R3
3355  016162 010267 000150                MOV   %2,TOODLE         ;GET READY TO DOODLE NUMBER IN TOODLE
3356  016166 005167 000144                COM   TOODLE            ;COMPENSATES FOR COMPLEMENT DURING BIC
3357  016172 046703 000140                BIC   TOODLE,%3         ;AND IN OCTAL CHARACTER
3358  016176 001410                       BEQ   WRTOC             ;ZERO, WRITE 0 IN LIST
3359  016200 066767 000136 000136 MKNUM: ADD   DECML,WGTCT       ;COUNT UP TO
3360  016206 005267 000134                INC   BINCT             ;AND RECORD
3361  016212 026703 000126                CMP   WGTCT,%3          ;SAME BINARY WEIGHT
3362  016216 001370                       BNE   MKNUM             ;KEEP COUNTN
3363  016220 062767 000260 000120 WRTOC: ADD   #260,BINCT        ;ADD ASCII PREFIX
3364  016226 016724 000114                MOV   BINCT,(4)+        ;WRITE ASCII CHAR IN LIST
3365  016232 066767 000102 000102         ADD   SEVEN,DECML       ;EXPAND BINARY WEIGHT
3366  016240 005067 000100                CLR   WGTCT
3367  016244 005067 000076                CLR   BINCT
3368  016250 005367 000074                DEC   ASCNT
3369  016254 001410                       BEQ   XLIST             ;5 CHAR IN LIST
3370  016256 012703 000003                MOV   #3,%3             ;SET X3 FOR ADD LOOP
3371  016262 066767 000052 000050 MOADD: ADD   SEVEN,SEVEN       ;MAKING SEVENTY BY SEVEN
3372  016270 005303                       DEC   %3
3373  016272 001373                       BNE   MOADD
3374  016274 000730                       BR    STAR              ;NX SEVEN SET GET NX OCTAL
3375  016276 012767 000005 000044 XLIST: MOV   #5,ASCNT          ;SEND 5 CHAR TO TTY
3376  016304 105777 177552         WAIT2: TSTB  @TCSR
3377  016310 100375                       BPL   WAIT2
3378  016312 014477 177542                MOV   -(4),@TDBR
3379  016316 005367 000026                DEC   ASCNT
3380  016322 001401                       BEQ   HDFHM             ;FINISH PRINTING GET NXT NUM
3381  016324 000767                       BR    WAIT2
3382  016326 105777 177530 HDFHM: TSTB  @TCSR
3383  016332 100375                       BPL   .-4
3384  016334 000207                       RTS   %7                ;HEAD FOR HOME
3385  016336 000000 TOODLE: 0
3386  016340 000000 SEVEN:  0
3387  016342 000000 DECML:  0
3388  016344 000000 WGTCT:  0
3389  016346 000000 BINCT:  0
3390  016350 000000 ASCNT:  0
3391  016352 000000 LIST:   0
3392  016354 000000         0
3393  016356 000000         0
3394  016360 000000         0
3395  016362 000000         0
3396
3397                        ;SCOPE LOOP ROUTINE ENTERED BY USER TRAP
3398                        ;SCOPE OR/AND ITERATION LOOP FOR EACH TEST 4000 TIMES
```

```
3399  016364  032777  040000  161602  SCOPEC: BIT     @#40000,@SRPTR          ;TEST SR FOR SCOPE
3400  016372  001012                          BNE     SCOPEB                  ;YES SCOPE
3401  016374  032777  004000  161572          BIT     @#4000,@SRPTR           ;NO - TEST FOR ITERATION
3402  016402  001011                          BNE     SCOPEG                  ;INHIBIT ITERATION
3403  016404  026767  000032  000026          CMP     SCOPEF,ICOUNT
3404  016412  001405                          BEQ     SCOPEG                  ;EXIT - DONE
3405  016414  005267  000022                  INC     SCOPEF                  ;INCREMENT COUNT
3406  016420  016716  000020          SCOPEB: MOV     RETURN,@#6              ;REPOSITION THE STACK
3407  016424  000002                          RTI                             ;SCOPE RETURN
3408  016426  005067  000010          SCOPEG: CLR     SCOPEF                  ;CLEAR COUNT
3409  016432  011667  000006                  MOV     @#6,RETURN              ;SAVE SCOPE RETURN POINTER
3410  016436  000002                          RTI                             ;RETURN INLINE-NEXT TEST
3411  016440  004000          ICOUNT: 4000
3412  016442  000000          SCOPEF: 0                                       ;COUNT LOCATION FOR ITERATION LOOP
3413  016444  004416          RETURN: BEGIN                                   ;ADDRESS OF LAST TEST
3414
3415                          ;GROUP OF NESTED SUBROUTINES
3416  016446  000207          SUBR1:  RTS     %7              ;ONE INSTRUCTION
3417  016450  000277          SUBR2:  SCC                     ;ONE DEEP
3418  016452  000205                  RTS     %5
3419  016454  004537  016450  SUBR3:  JSR     %5,@#SUBR2      ;TWO DEEP
3420  016460  000204                  RTS     %4
3421  016462  004467  177766  SUBR4:  JSR     %4,SUBR3        ;THREE DEEP
3422  016466  000203                  RTS     %3
3423  016470  004367  177766  SUBR5:  JSR     %3,SUBR4        ;FOUR DEEP
3424  016474  000202                  RTS     %2
3425  016476  004267  177766  SUBR6:  JSR     %2,SUBR5        ;FIVE DEEP
3426  016502  000207                  RTS     %7
3427                          ;ENTER HERE OR POWER FAIL
3428
3429  016504  010046          PFAIL:  MOV     %0,-(6)                 ;SAVE REGISTER OR STACK
3430  016506  010146                  MOV     %1,-(6)                 ;WHEN POWERING DOWN
3431  016510  010246                  MOV     %2,-(6)
3432  016512  010346                  MOV     %3,-(6)
3433  016514  010446                  MOV     %4,-(6)
3434  016516  010546                  MOV     %5,-(6)
3435  016520  016746  161300          MOV     24,-(6)
3436  016524  012737  000002  000006  MOV     @RTI,@#6                ;IN CASE OF NO EAE
3437  016532  012700  016572          MOV     @#HAC,%0
```

```
016536  012720  161610          MOV     @AC,(%0)+
016540  017720  161602          MOV     @MQ,(%0)+
016544  017720  161602          MOV     @SC,(%0)+
016550  010046                  MOV     %0,-(%6)
016552  010667  000010          MOV     %6,SAVR6        ;STORE STACK POSITION, POWER FAIL FLAG
016556  012767  016600  161236  MOV     #RESTART,24
016564  000000                  HALT                    ;HALT ON POWER DOWN NORMAL
016566  000000          SAVR6:  0                       ;STACK IS SAVED HERE
016570  000000          HAC:    0
016572  000000          HMQ:    0
016574  000000          HSC:    0
016576  016706  177764  RESTART:        MOV     SAVR6,%6        ;RESTORE REGISTER OFF STACK
016602  012600                  MOV     (%6)+,%0
016604  014077  161542          MOV     -(%0),@SC
016610  014077  161532          MOV     -(%0),@MQ       ;MQ MUST BE LOADED BEFORE AC
016614  014077  161530          MOV     -(%0),@AC
016620  005037  000006          CLR     @#6             ;RESTORE TIME OUT
016624  012667  161172          MOV     (6)+,24         ;WHEN POWERING UP
016630  012605                  MOV     (6)+,%5
016632  012604                  MOV     (6)+,%4
016634  012603                  MOV     (6)+,%3
016636  012602                  MOV     (6)+,%2
016640  012601                  MOV     (6)+,%1
016642  012600                  MOV     (6)+,%0
016644  005037  016570          CLR     @#SAVR6
016650  104000                  HLT                     ;POWER FAIL OCCURRED
016652  000002                  RTI                     ;RETURN TO MAIN LINE
016654  125252          B:      125252
                        ;FIXED VALUES FOR USE IN TEST
016656                          B                       ;ADDRESS OF B
016660  052525                  052525
                        .=B+10
016662  177777          A:      -1
016664  016666                  A+4
                        .=A+4
016666  125252                  125252
016670  016672                  A+10                    ;ADDRESS OF A+10
016672  052525                  052525
                        ;FOR STORAGE
016674  000000          C:      0
016676  016674                  C                       ;ADDRESS OF C
                        .=C+10
016700  000000          TEMP:   0
016702  016700                  TEMP                    ;ADDRESS OF TEMP
                        .=TEMP+6
016704  016710                  TEMP+10                 ;ADDRESS OF TEMP+10 OR "D"
016710  000000          D:      0
                        .=.+40
016712  016762          FIN:    0                       ;BUFFER FOR SP
016714  000207          USER:   RTS     %7              ;OVERLAY USER ROUTINE HERE IF 4KW, USE BANK1 IF 8KW
                        ;PDP-11 MEMORY DETERMINATION AND SETUP
                        ;USE WITH VARIABLE CORE QUANTITY SYSTEMS
```

```
                016766                  .=FIN + 4               ;APPLICABLE TO SYSTEM TEST 21
016766  012767  000416  176564  DET1:   MOV     #BEGIN,TRPA+2
016774  012767  000401  176346          MOV     #401,SAVPSL     ;BR .+4
017002  004767  000412                  JSR     %7,MAINF
017006  023727  000042  016766          CMP     @#42,#DET1      ;CHECK FOR DOP1
017014  103401                          BLOS    .+4
017016  000207                          RTS     %7              ;NO CORE EXPANSION WITH DOP1
017020  032777  001000  161146          BIT     #1000,@SRPTR    ;CHECK VARIABLE CORE SWITCH
017026  001401                          BEQ     DET4            ;USE VARIABLE CORE ROUTINE
017030  000207                          RTS     %7              ;4K ONLY
017032  012767  017100  160744  DET4:   MOV     #DET2,4         ;TRAP VECTOR SETUP
017040  012767  000340  160740          MOV     #340,6          ;TRAP STATUS SETUP
017046  026727  017770          EIGHT:  ADDC    #37770          ;CHECK FOR 8K
017054  026727  057770          TWELVE: ADDC    #57770          ;CHECK FOR 12K
017062  026727  077770          SXTEEN: ADDC    #077770         ;CHECK FOR 16K
017070  026727  117770          TWENTY: ADDC    #117770         ;CHECK FOR 20K
017076  026727  137770          TWOFOR: ADDC    #137770         ;CHECK FOR 24K
017104  026727  157770          TWOEIG: ADDC    #157770         ;CHECK FOR 28K
017112  000430                  DET2:   BR      STRT28
017114  012602                          MOV     (6)+,%2         ;RETRIEVE TRAP PC
017116  005726                          TST     (6)+            ;DISCARD TRAP STATUS WORD
017120  022702  017052                  CMP     #EIGHT+4,%2
017124  001542                          BEQ     DET3            ;4K
017126  022702  017056                  CMP     #TWELVE+4,%2
017132  001437                          BEQ     STRT8                   ;8K
017134  022702  017062                  CMP     #SXTEEN+4,%2
017140  001431                          BEQ     STRT12          ;12K
017142  022702  017066                  CMP     #TWENTY+4,%2
017146  001423                          BEQ     STRT16          ;16K
017150  022702  017072                  CMP     #TWOFOR+4,%2
017154  001415                          BEQ     STRT20          ;20K
017156  000411                          BR      STRT24          ;24K
017160  005000                  MOVE:   CLR     %0              ;SET UP MAIN CORE CURRENT
017162  012021                          MOV     (0)+,(1)+       ;MOVE WORD
017164  020027  016764                  CMP     %0,@#FIN+2      ;MOVE COMPLETE?
017170  001374                          BNE     .-6             ;MOVE ANOTHER WORD
017172  000207                          RTS     %7              ;MOVE COMPLETE
017174  004767  000040          STRT28: JSR     %7,XFER28       ;START 28K TRANSFER
017200  000450                          BR      MOD24           ;START 24K MODIFY
017202  004767  000042          STRT24: JSR     %7,XFER24       ;START 24K TRANSFER
017206  000453                          BR      MOD20           ;START 20K MODIFY
017210  004767  000044          STRT20: JSR     %7,XFER20       ;START 20K TRANSFER
017214  000456                          BR      MOD16           ;START 16K MODIFY
017216  004767  000046          STRT16: JSR     %7,XFER16       ;START 16K TRANSFER
017222  000461                          BR      MOD12           ;START 12K MODIFY
017224  004767  000050          STRT12: JSR     %7,XFER12       ;START 12K TRANSFER
017230  000464                          BR      MOD8            ;START 8K MODIFY
017232  004767  000052          STRT8:  JSR     %7,XFER8        ;START 8K TRANSFER
017236  000467                          BR      MOD4            ;START 4K MODIFY
017240  012701  140000          XFER28: MOV     #140000,%1      ;SET UP MOVE START LOCATION
017244  004767  177710                  JSR     %7,MOVE         ;GO TO MOVE SUBROUTINE
017250  012701  120000          XFER24: MOV     #120000,%1
017254  004767  177700                  JSR     %7,MOVE
017260  012701  100000          XFER20: MOV     #100000,%1
017264  004767  177670                  JSR     %7,MOVE
017270  012701  060000          XFER16: MOV     #60000,%1
```

```
017260  004767  177660                    JSR     %7,MOVE
017264  012701  040000          XFER12:   MOV     #40000,%1
017270  004767  177650                    JSR     %7,MOVE
017274  012701  020000          XFER8:    MOV     #20000,%1
017300  004767  177640                    JSR     %7,MOVE
017304  000207                            RTS     %7                      ;RETURN FROM TRANSFERS
017306  012767  144424  116244  MOD24:    MOV     #BEGIN+140006,TRPA+120002
017314  012767  000240  116026            MOV     #NOP,SKPBEL+120000
017322  012767  124424  076230  MOD20:    MOV     #BEGIN+120006,TRPA+100002
017330  012767  000240  076012            MOV     #NOP,SKPBEL+100000
017336  012767  104424  056214  MOD16:    MOV     #BEGIN+100006,TRPA+60002
017344  012767  000240  055776            MOV     #NOP,SKPBEL+60000
017352  012767  064424  036200  MOD12:    MOV     #BEGIN+60006,TRPA+40002
017360  012767  000240  035762            MOV     #NOP,SKPBEL+40000
017366  012767  044424  016164  MOD8:     MOV     #BEGIN+40006,TRPA+20002
017374  012767  000240  015746            MOV     #NOP,SKPBEL+20000
017402  012767  024424  176150  MOD4:     MOV     #BEGIN+20006,TRPA+2
017410  012767  000240  175732            MOV     #NOP,SKPBEL
017416  000207                  DET3:     RTS     %7                      ;RETURN FROM MODIFY
                                ;ROUTINE TO SET ACTION ENABLE ON MA/MF PARITY MEMORIES
                                ;CALL:    JSR     PC,.MAMF

        172100                            PARCSR= 172100                  ;ADDRESS OF FIRST MA/MF PA
        000114                            PARVEC= 114                     ;ADDRESS OF PARITY INTERRU
        000004                            ERRVEC=4
        000000                            R0=%0
        000006                            SP=%6
        000002                            R2=%2
        000007                            PC=%7

017420  012737  000006  000004  .MAMF:    MOV     #ERRVEC+2,@#ERRVEC
017426  012737  000002  000006            MOV     #RTI,@#ERRVEC+2
017434  012700  172100                    MOV     #PARCSR,R0              ;GET FIRST CSR ADDRESS
017440  012702  000001                    MOV     #1,R2

                                                                          ;SET TIME OUT INDICATOR
017444  012720  000001          1$:       MOV     #1,(R0)+                ;SET ACTION ENABLE IF AVAI
                                                                          ;BRANCH IF CSR NOT AVAILAB
017450  006302                            ASL     R2                      ;SHIFT AVAILABILITY INDICA
017452  103374                            BCC     1$
017454  000207                            RTS     PC
017456  104000                  .PARSRV:  HLT                             ;PARITY ERROR
017460  000137  000502                    JMP     @#START
        000001                            .END
```

CROSS REFERENCE TABLE -- USER SYMBOLS

SEQ 0068

```
A       016666  1620  1625  1654  1660  1666  1672  1679  1684  1691  1697  1711  1718  1741
                1749  1773  1787  1794  2099  2139  2199  2205  2212  2220  2236  2248  2254
                2260  2266  2272  2278  2285  2290  2297  2304  2311  2318  2341  2349  2643
                2704  2710  2717  2724  2766  3471#  3472  3474  3476
AC      000352   710#  3154*  3156  3169*  3171  3184*  3186  3199  3212*  3214  3438  3453*
ACT     015512  3258  3261  3265#
AOSUB   014136  3007  3012#
ARIEND  014200  3010  3021#
ARITST  014112  3006#  3009
ASCNT   016350  3344*  3368*  3375*  3379*  3390#
ASH     000370   717#  3170*
B       016656  1780  1936  1940  1945  1951  1958  1963  1964  1970  1984  1992  1999  2005
                2048  2053  2058  2064  2071  2076  2077  2084  2098  2105  2112  2118  2126
                2508  2513  2519  2524  2530  2537  2542  2543  2593  2598  2603  2608  2615
                2620  2621  2628  2642  2738  2739  2744  2745  2750  2751  3465#  3467  3470
BEGANY  015444  3350  3352#
BEGIN   004416   803   894  1096  1615#  3263  3278  3413  3495  3556  3558  3560  3562  3564
                3566
BEG20   015436  3245  3251#
BELL    015364  3239#
BINCT   016346  3341*  3360*  3363*  3364  3367*  3389#
BR      =000002  1101#
BUFF    =016762   586#   760   775   791   812  1650  3339#
C       016700  1703  1726  1794*  1810*  1826*  1841*  1857*  1873*  1891*  1909*  1963*  1964  1983*
                1984*  1985  2076*  2077  2097*  2098*  2099  2227*  2229  2233*  2237  2326  2398*
                2414*  2432*  2448*  2464*  2482*  2500*  2542*  2543  2620*  2621  2641*  2642*  2643
                2731*  2733  2756  2757*  2759  2763*  2767  3479#  3480  3482
CC      =177776   584#  3130#
CLEAR   015532  3267  3268  3269#
CLINCT  002270   869*  1003  1006*  1013*  1025#
CMP1    014206  3026#  3033
CMP2    014230  3030  3034#
COMPAR  014202  3024#
CURPAT  002264   870*   995*   996  1007  1009*  1011*  1023#
D       016720  1802*  1818*  1833*  1849*  1865*  1882*  1900*  2374*  2382*  2390*  2406*  2421*  2440*
                2456*  2473*  2491*  3488#
DATA1   001574   808*   908   911*   913*  917#
DATA2   001622   809*   924*   925   928#
DATA3   001676   810*   936   939*   941*  945#
DATA4   001772   811*   949*   950   961*  965#
DECML   016342  3346*  3359  3365*  3387#
DELAY   001776   813*   833*   955   960  967#
DET1    016766   886  3495#  3498
DET2    017100  3504  3513#
DET3    017416   829   830  3516  3568#
DET4    017032  3502  3504#
DIV     000362   714#  3213*
DO      =000001   864  1104#  1157  1165  1206
EAESRT  014732   753*  3001  3149#
EIGHT   017046  3506#  3515
ENDEAE  015322  3150  3227#
ERRVEC= 000004  3574#  3580*  3581*
ESTART  000570   771   774#
EXPRIN  016050  3329  3331#
F       =000000  1102#
FENDZ   002674   670   863  1113#  1148
```

```
FEND1   002716          1115    1118#
FIN     016762           586    3339#   3490#   3494    3528
H3C     016572          3437    3446#
HDFHM   016326          3380    3382#
HLT   = 104000           582#    746#    773     788     796     905     910     923     933     938     954     976     1002
                        1035    1055    1064    1086    1125    1129    1138    1144    1169    1176    1180    1191    1197
                        1211    1622    1627    1656    1662    1668    1674    1681    1686    1693    1699    1706    1714
                        1721    1728    1735    1744    1750    1760    1768    1775    1780    1789    1796    1805    1813
                        1821    1828    1836    1844    1850    1860    1868    1876    1885    1894    1903    1912    1919
                        1931    1937    1945    1947    1954    1962    1969    1973    1980    1987    1995    2001    2008
                        2015    2022    2028    2036    2043    2050    2055    2060    2067    2073    2079    2087    2094
                        2101    2108    2114    2121    2128    2136    2142    2150    2157    2164    2171    2178    2186
                        2194    2201    2207    2214    2223    2231    2239    2244    2250    2256    2262    2268    2274
                        2280    2287    2293    2299    2306    2314    2321    2328    2335    2344    2352    2360    2368
                        2377    2385    2393    2401    2409    2417    2424    2427    2435    2443    2451    2459    2467
                        2476    2485    2494    2503    2510    2515    2521    2526    2533    2538    2545    2552    2559
                        2566    2573    2580    2588    2595    2600    2605    2611    2617    2623    2631    2638    2645
                        2652    2659    2666    2673    2680    2688    2691    2699    2706    2712    2719    2727    2735
                        2741    2747    2753    2761    2769    2778    2787    2795    2797    2798    2801    2809    2811
                        2814    2820    2822    2825    2832    2834    2837    2844    2846    2849    2856    2858    2861
                        2868    2870    2873    2917    5321    5324    5327    5931    5955    5959    5963    5965    5969
                        2981    2985    2988    2991    2995    3017    3028    3042    3055    3067    3077    3079    3081
                        3105    3107    3110    3112    3122    3136    3139    3147    3158    3161    3164    3173    3176
                        3179    3188    3191    3194    3201    3204    3207    3216    3219    3226    3230    3463    3591
HMQ     016574          3447#
HPCSR   000274           687#    821     825*    952
HPDBR   000276           688#    950*
HPOUT   001700           949#    962
HPOUTR  001716           649     953#
HPOUT1  001706           950#    963
HPOUT2  001762           958     961#
HRCSR   000270           685#    826     834*    931     942*    955*    960*
HRDBR   000272           686#    934     936
HSC     016576          3448#
HSRINR  001624           647     931#
HSRIN1  001662           941#
HSRIN2  001670           935     940     942#
ICOUNT  016440           774#   1617#   2893#   3086#   3089#   3099#   3114#   3128#   3403    3411#
IE    = 000500           864    1103#   1157    1165    1171    1206    1213
INTCNT  001774           956#    957     959#    966#
IRC     002512           666    1067#   1638
IRF     002610           664    1084#   1635
IRK     002322           673    1033#   1641
IRP     002426           677    1053#   1644
LIST    016352          3343    3391#
LKCSR   000300           689#    838#    971#    974     977#    981#    985     987#
LK1     002000           970#    984
LK2     002020           973#    980
LK3     002022           652     974#   1632
LK4     002040           978#    988
LLIMIT  002662          1029    1049    1063    1080    1096#   1647    1648#
LOGICA  015534           614    3270#
LPCSR   000302           690#    874#    880#    997     1000    1015
LPDBR   000304           691#    871#    996#   1014#
LPINTR  002144           872    1000#
LP1     002120           995#   1020    1022
```

F06


```
LP2       002126       996#   1010    1012
LP3       002206      1008    1011#
LP4       002216      1005    1013#
LP5       002254      1018    1021#
LP6       002154       869     993     998    1003#
LP80    = 002160       993#
LSH       000366       716#   3155#
MAINLI    001500       891#    893
MINUS     016150      3350    3353#
MKNUM     016200      3359#   3362
MOADD     016262      3371#   3373
MOD12     017352      3538    3562#
MOD16     017336      3536    3560#
MOD20     017322      3534    3558#
MOD24     017306      3532    3556#
MOD4      017402      3542    3566#
MOD8      017366      3540    3564#
MOVE      017144      3526#   3544    3546    3548    3550    3552    3554
MQ        000350       709#    805    3153#   3159    3168#   3174    3183#   3189    3197#   3202    3211#   3217    3439
                      3452#
MUL       000360       713#   3198#
N       = 000001      1219#   1225    1226    1227#   1228    1229    1230#   1231    1232    1233#   1234    1235    1236#
                      1237    1238    1239#   1240    1241    1242#   1243    1244    1245#   1246    1247    1248#   1249
                      1250    1251#   1252    1253    1254#   1255    1256    1257#   1258    1259    1260#   1261    1262
                      1263#   1264    1265    1266#   1267    1268    1269#   1270    1271    1272#   1273    1274    1275#
                      1276    1277    1278#   1279    1280    1281#   1282    1283    1284#   1285    1286    1287#   1288
                      1289    1290#   1291    1292    1293#   1294    1295    1296#   1297    1298    1299#   1300    1301
                      1302#   1303    1304    1305#   1306    1307    1308#   1309    1310    1311#   1312    1313    1314#
                      1315    1316    1317#   1318    1319    1320#   1321    1322    1323#   1324    1325    1326#   1327
                      1328    1329#   1330    1331    1332#   1333    1334    1335#   1336    1337    1338#   1339    1340
                      1341#   1342    1343    1344#   1345    1346    1347#   1348    1349    1350#   1351    1352    1353#
                      1354    1355    1356#   1357    1358    1359#   1360    1361    1362#   1363    1364    1365#   1366
                      1367    1368#   1369    1370    1371#   1372    1373    1374#   1375    1376    1377#   1378    1379
                      1380#   1381    1382    1383#   1384    1385    1386#   1387    1388    1389#   1390    1391    1392#
                      1393    1394    1395#   1396    1397    1398#   1399    1400    1401#   1402    1403    1404#   1405
                      1406    1407#   1408    1409    1410#   1411    1412    1413#   1414    1415    1416#   1422#   1423
                      1424    1425#   1426    1427    1428#   1429    1430    1431#   1432    1433    1434#   1435    1436
                      1437#   1438    1439    1440#   1441    1442    1443#   1444    1445    1446#   1447    1448    1449#
                      1450    1451    1452#   1453    1454    1455#   1456    1457    1458#   1459    1460    1461#   1462
                      1463    1464#   1465    1466    1467#   1468    1469    1470#   1471    1472    1473#   1474    1475
                      1476#   1477    1478    1479#   1480    1481    1482#   1483    1484    1485#   1486    1487    1488#
                      1489    1490    1491#   1492    1493    1494#   1495    1496    1497#   1498    1499    1500#   1501
                      1502    1503#   1504    1505    1506#   1507    1508    1509#   1510    1511    1512#   1513    1514
                      1515#   1516    1517    1518#   1519    1520    1521#   1522    1523    1524#   1525    1526    1527#
                      1528    1529    1530#   1531    1532    1533#   1534    1535    1536#   1537    1538    1539#   1540
                      1541    1542#   1543    1544    1545#   1546    1547    1548#   1549    1550    1551#   1552    1553
                      1554#   1555    1556    1557#   1558    1559    1560#   1561    1562    1563#   1564    1565    1566#
                      1567    1568    1569#   1570    1571    1572#   1573    1574    1575#   1576    1577    1578#   1579
                      1580    1581#   1582    1583    1584#   1585    1586    1587#   1588    1589    1590#   1591    1592
                      1593#   1594    1595    1596#   1597    1598    1599#   1600    1601    1602#   1603    1604    1605#
                      1606    1607    1608#   1609    1610    1611#   1612    1613
NOEAE     000472       753#    804
NOP     = 000240       581#   3129#   3557    3559    3561    3563    3565    3567
NOR       000364       715#   3185#
NUMA      014176      3004#   3013    3014    3020#
PARCSR= 172100        3572#   3582
```

```
PARVEC= 000114            3573#
PFAIL   016504             605#    759     3231    3429#
PRFLAG  015562             779*   3279#    3283    3286*   3327*
PRINT   015564             608#   3283#
PRINT1  016020            3290#   3324#
PRTAB   016070            3307#   3312     3317    3341#
R       =  000000          864#   1105#    1157
RB      =  000002          864#   1100#    1157    1171    1213
RCBAR   000326             700#   1063#
RCCSR   000330             701#    858*    1065*   1067
RCCSRH  000332             702#
RCDAR   000322             698#    851*    1062*   1071*   1072
RCFUNC  002550             853*   1065     1074*   1076#
RCSTAR  002460            1062#   1070     1075
RCWC    000324             699#   1064#
RCWORD= 176040             592#   1064
RC2     002466            1063#   1073
RD      =  000004         1098#   1206
REF     =  013612         2935#   3005*    3006*   3012    3015    3118*   3120    3124#
REFF    013612            2897*   2898*    2900    2904    2929    2933#   2935    2937*   2938*   2941    2944    2967    2993
                          3008
REG1    001516             769*    780      895#    3092
RENDZ   003062            1140    1151#    1181
RENDI   003112            1154    1157#
RESTAR  016600            3443    3449#
RETURN  016444             776*    803*    1615*   3316    3406    3409*   3413#
RFCAR   000314             695#   1080#
RFCSR   000316             696#    856*    1082*   1084
RFCSRH  000320             697#   1078#
RFDAE   000306             692#   1089
RFDAR   000310             693#   1079#   1088*   1091
RFFUNC  002660             852*   1082     1093*   1095#
RFSTAR  002552            1078#   1087     1094
RFWC    000312             694#   1081#
RFWORD= 176040             593#   1081
RF1     002564            1080#   1090     1092
RKBAR   000342             706#   1029#
RKCSR   000344             707#    857*     884*    1031*   1033
RKCSRH  000346             708#
RKDAE   000336             704#   1028#    1037
RKDAH   000334             703#   1039
RKFUNC  002364             854#   1031     1041*   1044#
RKSTAR  002272            1028#   1036     1042
RKWC    000340             705#   1030#
RKWORD= 176000             590#   1030
RK1     002276            1029#   1038     1040
ROTALL  013472            2899    2904#
ROTBE   013652            2939    2944#
ROTBO   013762            2940    2971#
ROTEN1  014064            2943    2997#
RPBAR   000424             734#   1049#
RPCA    000410             728#   1057
RPCSR   000426             735#    842      844*    845     859*    1046*   1047    1051*   1053
RPCSRH  000430             736#
RPDAE   000414             730#
RPDAH   000412             729#
```

```
RPDAR   000420          732#
RPDSR   000416          731#    847     849#
RPFUNC  000432          737#    855#    1051    1059#
RPSTAR  002366         1046#   1056     1060
RPWC    000422          733#   1050#
RPWORD= 176000          591#   1050
RP1     002402         1049#   1058
RTIA    001520          806     850      879     896#
SAVCC   016066         3292#   3311    3338#
SAVPC   016064         3291#   3306    3337#
SAVR2   016052         3303#   3318    3332#
SAVR3   016054         3304#   3319    3333#
SAVR4   016056         3305#   3320    3334#
SAVR6   016570          770     772#   3442#   3445#   3449    3462#
SBELL   015400         3237    3243#
SC      000354          711#   3192    3440    3451#
SCOPE = 104400          583#    783     789     798     801    1616    1623    1628    1657    1663    1669    1675    1682
                       1687    1694    1700    1707    1715    1722    1729    1736    1745    1753    1761    1769    1776
                       1783    1790    1797    1806    1814    1822    1830    1837    1845    1853    1861    1869    1877
                       1886    1895    1904    1913    1921    1932    1938    1943    1948    1955    1961    1967    1974
                       1981    1988    1996    2002    2009    2016    2023    2030    2037    2044    2051    2056    2061
                       2068    2074    2080    2088    2095    2102    2109    2115    2122    2130    2137    2143    2151
                       2158    2165    2172    2179    2187    2195    2202    2208    2215    2224    2232    2240    2245
                       2251    2257    2263    2269    2275    2281    2288    2293    2300    2307    2315    2322    2329
                       2336    2345    2353    2361    2369    2378    2386    2394    2402    2410    2418    2428    2436
                       2444    2452    2460    2468    2477    2486    2495    2504    2511    2516    2522    2527    2534
                       2540    2546    2553    2560    2567    2574    2581    2589    2596    2601    2606    2612    2618
                       2624    2632    2639    2646    2653    2660    2667    2674    2681    2692    2700    2707    2713
                       2720    2728    2736    2742    2748    2754    2762    2770    2781    2789    2802    2804    2815
                       2826    2838    2850    2862    2874    2896    2928    2966    2992    2997    3011    3018    3021
                       3034    3046    3059    3071    3085    3087    3098    3113    3127    3140    3148    3152    3167
                       3182    3196    3210    3220    3227
SCOPEB  016420         3400    3406#
SCOPEC  016364          611    3399#
SCOPEF  016442          777#   3403    3405#   3408#   3412#
SCOPEG  016426         3402    3404    3408#
SEVEN   016340         3345#   3354    3365    3371#   3386#
SKPBEL  015350         3234#   3496#   3557#   3559#   3561#   3563#   3565#   3567#
SOFTSR  000176          660#    765
SOLPAT  002266          868#    995    1017    1019#   1021#   1024#
SRE     000356          712#   3162    3177    3205
SRPTR   000174          659#    762     765#    769     892    3257    3288    3324    3328    3399    3401    3501
STAR    016156         3352    3354#   3374
START   000502          662     724     759#   3274    3330    3592
START2  000642          776     784#
STATUS= 177776          680#    778#    814#    889#    972#    982#   3294#
STRT12  017210         3520    3539#
STRT16  017202         3522    3537#
STRT20  017174         3524    3535#
STRT24  017166         3525    3533#
STRT28  017160         3512    3531#
STRT8   017216         3518    3541#
ST1     001036          816     818#
ST2     001050          819     821#
ST3     001070          822     824     826#
ST3A    001104          828     831#
```

```
ST4        001122     827     832     835#
ST5        001140     836     839#
ST5A       001210     841     850#
ST6        001274     840     860#
ST7        001322     861     865#
ST8        001404     866     867     875#
ST8A       001450     878     883     885#
SUBR1      016446    3416#
SUBR2      016450    3417#   3419
SUBR3      016454    3419#   3421
SUBR4      016462    3421#   3423
SUBR5      016470    3423#   3425
SUBR6      016476    2793    3425#
SWABA      014604    3119#   3126
SXTEEN     017056    3508#   3519
TC       = 177340     720#    721     722     723     725     726
TCBA       000404     726#   1164*   1205*
TCBLK      002670    1109#
TCCM       000372     721#    864*   1116*   1119*   1121*   1123    1132*   1136    1146*   1155*   1157*   1165*   1167
                     1171*   1174    1182*   1185*   1189    1199*   1206*   1209    1213*
TCDT       000376     723#   1126    1139    1142    1177    1192    1195
TCEXPE     002672     862*   1110#   1120*   1126    1141*   1142    1152*   1177    1194*   1195
TCFIRS     002664     862    1107#   1120    1192
TCF1       002746    1118    1123#
TCF1A      002740    1121#   1127
TCF2       002774    1128    1131#
TCF3       003010    1131    1136#   1170
TCF4       003052    1146#   1172
TCIV       000406     727#    863*   1113*   1118*   1131*   1151*   1158*   1162*   1170*   1184*   1203*   1212*
TCLAST     002666    1108#   1139    1152
TCOM       014242    3038#   3045
TCOM2      014310    3051#   3058
TCOM3      014356    3063#   3070
TCRBK      003332    1198    1203#
TCRBUF     003416     743     747    1205    1218#
TCRB1      003370    1203    1209#
TCR1       003210    1158    1174#
TCR1A      003240    1179    1182#
TCR2       003246    1178    1184#
TCR3       003262    1184    1189#   1212
TCR4       003324    1199#   1214
TCSR       016062     585    3240    3295    3298    3301    3309    3314    3322    3336#   3347    3376    3382
TCST       000374     722#   1114    1153
TCWBK      003130    1145    1162#
TCWBUF     003416    1164    1217#
TCWB1      003162    1162    1167#
TCWC       000402     725#   1163*   1204*
TC1        000434     740#   1207
TC2        000446     744#    746
TDBR       016060    3239*   3297*   3300*   3308*   3313*   3321*   3335#   3351*   3353*   3378*
TDSR     = 016062     585#
TEMP       016710    1711*   1712    1718*   1719    1725*   1732*   1733    1739*   1741*   1742    1747*   1749*   1750
                     1755*   1757*   1758    1764*   1765*   1766    1771*   1773*   1778*   1780*   1785*   1787*   1792*
                     1800*   1803    1808*   1811    1816*   1819    1824*   1827    1831*   1834    1839*   1842    1847*
                     1850    1855*   1858    1863*   1866    1871*   1874    1879*   1883    1888*   1892    1897*   1901
                     1906*   1910    1957*   1958    1976*   1977*   1978    1998*   1999*   2004*   2005*   2006    2011*
```

```
                    2012#  2013   2018#  2019#  2020   2025#  2026#  2027   2032#  2033#  2034   2039#  2040#
                    2041   2070#  2071   2090#  2091#  2092   2111#  2112#  2117#  2118#  2119   2132#  2133#
                    2134   2138#  2139#  2140   2146#  2147#  2148   2153#  2154#  2155   2160#  2161#  2162
                    2167#  2168#  2169   2174#  2175#  2176   2181#  2183#  2184   2189#  2191#  2192   2219#
                    2220#  2221   2228#  2236#  2311#  2312   2318#  2319   2325#  2332#  2333   2339#  2341#
                    2342   2347#  2349#  2350   2355#  2357#  2358   2364#  2365#  2366   2372#  2375   2380#
                    2383   2388#  2391   2396#  2399   2404#  24C7   2412#  2415   2419#  2422   2425   2430#
                    2433   2438#  2441   2446#  2449   2454#  2457   2462#  2465   2470#  2474   2479#  2483
                    2488#  2492   2497#  2501   2536#  2537   2548#  2549#  2550   2555#  2556#  2557   2562#
                    2563#  2564   2569#  2570#  2571   2576#  2577#  2578   2583#  2584#  2585#  2586   2614#
                    2615   2634#  2635#  2636   2648#  2649#  2650   2655#  2656#  2657   2662#  2663#  2664
                    2669#  2670#  2671   2676#  2677#  2678   2683#  2685#  2686   2689   2694#  2696#  2697
                    2723#  2724#  2725   2732#  2766#  2806#  2807#  2812   2817#  2818#  2823   2829#  2830#
                    2835   2841#  2842#  2847   2853#  2854#  2859   2865#  2866#  2871   3036#  3037#  3038#
                    3039#  3040   3043#  3044#  3049#  3050#  3051#  3052#  3053   3056#  3057#  3061#  3062#
                    3063#  3064#  3065   3068#  3069#  3074#  3075   3082#  3083   3132#  3134#  3137   3143
                    3144#  3221#  3223#  3224   3483#  3484   3486   3487
TEST    013614      2904#  2905#  2906#  2907#  2908#  2909#  2910#  2911#  2912#  2929   2934#  2944#  2945#
                    2946#  2947#  2948#  2949#  2950#  2967   2971#  2972#  2973#  2974#  2975#  2976#  2993
                    3012#  3013#  3014#  3015   3102#  3103#  3108#  3117#  3119#  3120   3123#  3125#
TIME    002116       837#   970#   978#   979    983    989#
TJSR1   013044      2776#  2777
TJSR2   013046      2775   2777#
TJSR3   013060      2776   2781#  2785
TOODLE  016336      3355#  3356#  3357   3385#
TRCSR   000260       681#   784#   786    820#   903    914#
TRDR    000262       682#   906    908
TRPA    015556      3235   3278#  3495#  3556#  3558#  3560#  3562#  3564#  3566#
TRPB    015550       875#  3260#  3275#
TSCOMB  014420      3075#  3084
TSROT   013450      2898#  2901
TSROT2  013624      2938#  2942
TSRT2A  013616      2902   2937#
TSTART  014100      3004#
TTCSR   000264       683#   793#   794    797#   799#   800#   817#   881#   921    3236
TTDBR   000266       684#   925#
TTYINR  001522       643    903#
TTYIN1  001560       913#
TTYIN2  001566       907    912    914#
TTYIN3  001552       909    911#
TTYIN4  001556       912#
TWELVE  017052      3507#  3517
TWENTY  017062      3509#  3521
TWOEIG  017072      3511#
TWOFOR  017066      3510#  3523
TYOUTR  001576       645    921#
TYOUT1  001612       925#
USER    016764       885    3491#
WAIT1   016126      3347#  3348
WAIT2   016304      3376#  3377   3381
WAIT3   014470      3087#
WAIT4   014520      3093   3098#
WAIT5   014472      3088#
WD    = 000014      1099#  1165
WGTCT   016344      3342#  3359#  3361   3366#  3388#
WRTOC   016220      3358   3363#
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XFEND2  003060  1148#  1193
XFER12  017264  3533   3551#
XFER16  017254  3537   3549#
XFER20  017244  3535   3547#
XFER24  017234  3533   3545#
XFER28  017224  3531   3543#
XFER8   017274  3541   3553#
XLIST   016276  3369   3375#
XX      =000000  594#   917    928    945    965
YESRT   015552  3249#  3251#  3259   3276#
YESTR   015452  3256#
YESTR1  015504  3263#  3266
YESTR2  015510  3264#
.       =017464  595#   600    601#   602    604#   607#   610#   613#   615#   642#   651#   654#   658#
                 661#   663#   669#   672#   676#   748    787    795    843    846    848    890    904
                 922    932    937    953    975    986    1001   1016   1034   1048   1054   1068   1085
                 1124   1137   1143   1168   1175   1190   1196   1210   1621   1626   1655   1661   1667
                 1673   1680   1685   1692   1698   1705   1713   1720   1727   1734   1743   1751   1759
                 1767   1774   1781   1788   1795   1804   1812   1820   1828   1835   1843   1851   1859
                 1867   1875   1884   1893   1902   1911   1930   1936   1941   1946   1953   1958   1965
                 1972   1979   1986   1994   2000   2007   2014   2021   2028   2035   2042   2049   2054
                 2059   2066   2072   2078   2086   2093   2100   2107   2113   2120   2128   2135   2141
                 2149   2156   2163   2170   2177   2185   2193   2200   2206   2213   2222   2230   2238
                 2243   2249   2255   2261   2267   2273   2279   2286   2291   2298   2305   2313   2320
                 2327   2334   2343   2351   2359   2367   2376   2384   2392   2400   2408   2416   2423
                 2426   2434   2442   2450   2458   2466   2476   2484   2493   2502   2509   2514   2520
                 2525   2532   2538   2544   2551   2558   2565   2572   2579   2587   2594   2599   2604
                 2610   2616   2622   2630   2637   2644   2651   2658   2665   2672   2679   2687   2690
                 2698   2705   2711   2718   2726   2734   2740   2746   2752   2760   2768   2778   2786
                 2794   2796   2798   2800   2808   2810   2813   2819   2821   2824   2831   2833   2836
                 2843   2845   2848   2855   2857   2860   2867   2869   2872   2914   2915   2916   2918
                 2919   2920   2922   2924   2926   2928   2930   2952   2954   2954   2956   2957   2958
                 2960   2961   2963   2964   2968   2978   2979   2980   2982   2983   2984   2986   2987
                 2989   2990   2994   3000   3016   3027   3041   3054   3066   3076   3078   3080   3104
                 3106   3109   3111   3121   3135   3138   3146   3149   3157   3160   3163   3172   3175
                 3178   3187   3190   3193   3200   3203   3206   3215   3218   3225   3229   3234   3241
                 3284   3289   3296   3299   3302   3310   3315   3323   3325   3383   3470#  3474#  3482#
                 3486#  3489#  3494#  3499   3529
.M3MF   017420  3497   3580#
.PARSR  017456  655    3591#
```

```
.MAIN.  MACY11 30(1046)  16-SEP-77  12:59  PAGE 78
DZQKBG.P11    16-SEP-77 12:58          CROSS REFERENCE TABLE -- MACRO NAMES                    SEQ 0076

TNCV     2876#   2913    2951    2977

. ABS.  017464     000

 ERRORS DETECTED:  0

 DZQKBG.BIN,DZQKBG.LST/CRF/SOL/NL:TOC=DZQKBG.P11
 RUN-TIME:  3  6  1 SECONDS
 RUN-TIME RATIO: 228/11=20.4
 CORE USED:  11K  (21 PAGES)
```